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Improved measurement and monitoring of MDGs in Moldova: *targets, indicators, definitions, data sources, progress analysis*

Results of technical support missions by specialized statistician experts

MDG 4-5: *Reduce child mortality and improve maternal health*

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UNDP advisory mission to review and improve health indicators in the Republic of Moldova:

Millennium Development Goals 4 & 5

Mission report

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UNDP advisory mission to review and improve health indicators in the Republic of Moldova: Millennium Development Goals 4 & 5

BACKGROUND AND PURPOSE

The Republic of Moldova (henceforth Moldova) established national indicators and targets for the Millennium Development Goals (MDG) to reduce childhood mortality and improve maternal health; these are known as MDG 4 & 5, respectively. These health MDGs are defined in the National Development Strategy (NDS) 2008-2011 (Ministry of Economy and Trade 2007, pp 9-10)[1]. They are monitored regularly based on statistical data collected by the National Bureau of Statistics (NBS)[2] and the National Center for Health Management (NCHM)[3], a public institution under the auspices of the Ministry of Health (MoH). To date, the government has published two progress reports on national MDGs, in 2005[4] and 2010[5] (Government of Moldova 2005, 2010).

This mission was undertaken in order to address areas identified by the joint United Nations (UN) and NBS project 'Strengthening the National Statistical System', under the leadership of the United Nations Development Program (UNDP), that needed strengthening, including data collection and analysis related to health indicators. It builds upon an expert mission report conducted by Vladimir Mikhalev at the UNDP Bratislava Regional Centre, 'Support to improve monitoring of MDGs in Moldova' (June 2011).

In particular, in the framework of the present assignment, the 3-day mission focused on aspects of data collection, methodological issues related to generating indicators, and presentation as they relate to MDG 4 & 5. The visit to Chisinau was coordinated by the UNDP country office and involved meetings with various stakeholders. Appendix A shows the program of visits and list of persons met. The mission report presents findings according to the following topics: Data sources and flows; Data quality; MDG 4 & 5 Targets and tracking; Analysis and presentation of MDG progress; and Conclusions and recommendations.

DATA SOURCES AND FLOWS

Birth and death registration data, and cause of death data, are the main sources of information used for monitoring MDG 4 & 5. In Moldova, the MoH, NBS and Civil Registration Department (of the Ministry of Justice) collaborate on producing comprehensive, timely, vital statistics that are disaggregated by geographical area, age, sex and cause of death:

"According to the Common Order of the Ministry of Health, National Bureau of Statistics and

[1] Throughout this document the Harvard author-date style of citation and referencing is used, whereby the author's surname and the year of publication of the work is cited in the text and, where relevant, page numbers are provided. The complete reference for each citation is provided separately at the end of this document, listed in alphabetical order.

[2] *Biroul Național de Statistică* http://www.statistica.md/ (accessed 11 July 2011)

[3] *Centrul National de Management in Sanatate* http://www.cnms.md/ (accessed 11 July 2011)

Department of Informational Technologies No 132 /47 /50 as of April 29th, 2004 regarding the approval of the medical death-confirming certificate (Form No 106-2e), registers and regulations on their fulfillment and issuance method and No 44/347/100 as of 11.10. 2005 regarding the approval in the new wording of the Order No 110/51/56 as of April 23rd, 2002 regarding the approval of the medical birth-confirming certificate (form No 103/e-2002), the information regarding the natural movement of population is collected by a single information flow and thus, the annual demographic data of the National Bureau of Statistics and Ministry of Health are identical, pursue the permanent control of the data movement (from the moment of birth/death-confirming certificate fulfillment until their statistical processing)." (cited in NCHM & HMN 2007, p. 26)

MDG indicators and other statistical data are available in user-friendly formats from both the MoH and NBS websites. The MoH has designated the NCHM to disseminate a wide variety of information on the web, including a data bank of routine demographic and health statistics reported by health facilities. This information is available by downloading the Data Presentation System (DPS) software that permits the user to select among a wide range of statistical data available by geographic area and by year[6]. These data, however, are generally not available by sex, age and residence (urban or rural milieu) which indicates that these attributes are probably not collected on reporting forms. The National Bureau of Statistics also maintains a data bank that provides extensive population and health statistics by year, geographic area, and depending on which indicator, it may be available by residence, sex and age[7]. Detailed notes and metadata are available on-line for each MDG indicator, produced by NBS, from the NBS website, but were obtained only in hardcopy from the NCHM.

Births

Birth registration. Birth registration in Moldova takes place in the hospital or maternity center following delivery. Only about 1% of births are delivered outside of a medical facility (NCPM and Macro 2006); in these rare cases, notification of the birth should be made at the closest health facility within three months from the day of birth. Health facilities report individual level information on each birth to the NCHM and to the NBS (and a subset of information is transmitted separately to the local civil registrar office).

Information collected by the civil registration office (ZAGS[8]) in the birth registration form (*Buletin statistic pentru nastere*, 19 August 2006) is largely in conformity with United Nations Economic and Social Affairs (UNESA) principles and recommendations for collection of the highest priority information (UNESA 2001). There are three main pieces of recommended information that are missing on the Moldova birth registration form: 1) Place of occurrence, 2) Date of last previous live birth, used to calculate the interval since the last previous live birth, and 3) characteristics of the father, including Marital status, Educational attainment, and Place of usual residence (Table 1). A second legal document, the physician certified birth certificate (*Certificat medical constatator al nasteri* Form 103/e), obtains information on Place of occurrence, that is, the name of the institution where the birth took place. If the birth registration form and the birth certificate are linkable by a unique code, then UNESA recommended information is largely captured.

[6] The CNMS Data presentation system (DPS) presents data in tabular or graphics format. The DPS was developed by the WHO Collaborating Centre for Health Statistics and Information and may be adapted to various needs of decision-makers, program managers, researchers, and other stakeholders. http://www.cnms.md/ (accessed July 25, 2010)

[7] The NBS data bank: http://statbank.statistica.md/ (accessed July 25, 2010)

[8] ZAGS is the acronym in latin letters for the name of the civil registration office in Russian language, За́пись а́ктов граждáнского состоя́ния (загс)

Table 1. UNESA-recommended items of information to collect on live births, and their availability on the '*Birth registration form*' and the '*Medical birth certificate'*, Moldova

	Birth registration (*Buletin statistic pentru nastere*, 19 August 2006)	Medical birth certificate (*Certificat medical constatator al nasteri,* Form 103/e)
Information about birth		
Date of occurrence (of birth)	X	x
Date of registration	X	*na*
Place of occurrence *(see definition below)*	*na*	X (name of institution)
Place of registration *(see definition below)*	X	*na*
Type of birth (i.e. single, twin, triplet, quadruplet, or higher multiple delivery)	X	X
Attendant at birth	X	X
Sex	X	X
Birth weight	X	X
Information about Mother		
Date of birth	X	X
Marital status	X	
Educational attainment	X	
Place of usual residence *(see definition below)*	X	X
Children born alive to mother during her entire lifetime	X	X
Children born to mother during her entire lifetime and still living	X	na
Foetal deaths to mother during her entire lifetime	X	*na*
Date of last previous live birth	*na*	*na*
Date of marriage	X	*na*
Information about Father		
Date of birth	X	*na*
Marital status	*na*	*na*
Educational attainment	*na*	*na*

x =available, *na* = not available

Source: UNESA 2001, p. 16-18

During the mission, there was a request for clarity on the definitions and rationale for 'Place of birth' and the 'Place of usual residence' on the forms. The international UNESA definitions of these places, as well as 'Place of registration', are:

> *Place of birth* - the geographic location in the country: (a) locality and (b) major division or other geographic place in which the locality is situated, where the live birth [or death, or delivery of a dead foetus] occurred. This information should be given in enough detail to enable tabulations to be made for at least the largest administrative subdivisions of the country and for the smaller administrative subdivisions as may be required for national use, and also to enable urban/rural distribution to be included in tabulations, where required. Countries should adopt procedures to handle the place of occurrence of vital events that may take place on moving vehicles, such as ships, airplanes, trains or cars. (cited in UNESA 2001, p. 28)

Place of registration - the geographic location in the country: (a) locality and (b) major civil division or other geographic place, where the live birth [or death, or delivery of a dead foetus] is registered into the civil registration system. This information should be indicated in enough detail to identify each specific registration office for a variety of administrative purposes, including following back for clarification of registration and statistical reporting problems, for local registration office workload analyses and for optimal geographic distribution of registration points with reasonable proximity to where vital events are occurring. (cited in UNESA 2001, p. 28)

Place of usual residence - the geographic location in the country, locality or civil division, or foreign country, where the specified person usually resides. This needs not be the same as either the place where he/she was found at the time of the occurrence of the event or inquiry, or his/her legal residence. For vital statistics purposes, the place of usual residence of a live birth or a foetal death is the place where the mother usually resides. (cited UNESA 2001, p. 29)

According to Article 7 of the Convention on the Rights of the Child, to which Moldova is a party since 1993, the child shall be registered immediately after birth[9]. While the 2000 Multiple Indicator Cluster Survey (MICS) shows overall high rates of children registered, it also shows a substantially smaller share of young children, age 0-6 months, that were registered compared to older children who were registered (89% versus 98-99% for all other children under 5 years) (NCPM and UNICEF 2000). Evidence of late birth registration may indicate that some children are not registered 'immediately' after birth—thereby increasing the likelihood that early deaths are not completely recorded. It is also acknowledged that this evidence dates back more than a decade and since then MoH has instituted mechanisms to ensure early registration of all live births and to eliminate gaps in reporting early deaths. The 2011 MICS will provide updated estimates of coverage of birth registration.

Deaths

Death registration. Deaths are registered with the civil registration office (ZAGS) on the death registration form (*Buletin statistic pentru deces,* 26 June 2006). This form contains all of the UNESA recommended information to collect except *Place of occurrence* (of death), and *Cause of death* and *certifier* (Table 2). These two pieces of information are, however, collected on the separate Medical certificate of death form. If information from the *Death registration form* and the *Medical certificate of death* are linkable by a unique code then UNESA recommended information is largely captured. Note that, according to the NCHM metadata for infant mortality, the numbers of infant deaths are obtained from the *Medical certificate of death* (Form 106/e).

Table 2. UNESA-recommended items of information to collect on deaths, and their availability on the *Death registration form* and the *Medical certificate of death*, Moldova

	Death registration (*Buletin statistic pentru deces,* 26 June 2006)	Medical certificate of death (*Certificat medical constatator al decesului,* Form 106/e)
Date of occurrence (of death)	x	x
Date of registration	x	na
Place of occurrence	na	x

[9] See Convention on the Rights of the Child, adopted and opened for signature, ratification and accession by General Assembly resolution 44/25 of 20 November 1989. http://www2.ohchr.org/english/law/crc.htm#art7 (accessed 2 August 2011)

Place of registration	x	na
Cause of death (*per WHO standard form*)	na*	x
Certifier[10]	na	x
Date of birth	x	x
Sex	x	x

x =available, *na* = not available

*Until 1996, statistics on ICD-10 causes of death were produced by both NBS and MoH, which resulted in divergences in data. Since then, in order to ensure coherent ICD-10 data, CNMS is the sole institution responsible for producing these statistics.

Source: UNESA 2001, p. 19-20; WHO 2008 p.34

Cause of death. A medically certified cause of death is provided by a physician who also assigns the underlying cause of death the ICD-10 code[11] (Form 106/e). Parts I and II of the *Medical Certificate of Death* (*Certificat medical constatator al decesului*), completed by a physician, comply with the international form recommended by the World Health Assembly (WHO 2008, p.34). The coding of deaths is decentralized, which means that the physician certifying the death also assigns the ICD-10 code, rather than the death certificate being transmitted to central place, such as at the rayon or national level coded by trained coders at a . (It was not clear if the certifying physician assigns the code directly on the certificate form prior to its being sent to the civil registration office, if so, it is not clear where the information is captured on the certificate.) These certificates are verified by medical personnel associated with the civil registration office, then sent in paper form to the NCHM where they are entered in a data base, including the ICD-10 code. The WHO recommendation for coding differs slightly from this process, it recommends that coding be done 'by a qualified and trained coder[12], not the physician who certified the death as he or she is unlikely to have been formally trained in the coding of information given on the death certificate' (AbouZahr *et al*. 2010, p. 20). MoH routinely sends the NBS summary tables on causes of death, which are uploaded on the institution's website and published in the yearly books.

The MoH transmits Moldova's cause of death information annually to the World Health Organization. This information on approximately 3,000 causes of death is available on the World Health Organization Statistical Information System (WHOSIS) Mortality Database website for the years 1996 to 2009[13]. The ICD-10 mortality tabulation lists for underlying causes of death in Moldova consist of the 4-character detailed list since 2007 (prior to that, the 3-character detailed list). Causes of death are broken down by age groups and by sex, with the age format for the breakdown of infant deaths (<1 year) reported according to detailed ages (0 days, 1-6 days, 7-27 days, and 28-365 days). Based on an earlier assessment of the quality of Moldova's cause of death data from data available from 1981 to 2001, Moldova was considered to have 'high' quality cause of death data,

[10] The certifier is the person who certifies the fact of death or foetal death, and who in the case of death also certifies the circumstances (accident, suicide, homicide, natural causes) and the specific disease, injury or other cause(s) of death. Data should be collected in such a way as to permit classification of deaths according to whether the death was certified by a physician or surgeon who attended the decedent in his terminal illness, a medical practitioner who examined the body after death, a coroner or other medical-legal authority, a midwife, a nurse (other trained person) or a layman. (UNESA 2001, p.39)

[11] ICD-10 is the international classification of diseases, version 10, endorsed by the World Health Assembly in 1990. An ICD code is used to classify diseases and other health problems recorded on many types of health and vital records including death certificates and health records. For more information on this international standard classification see http://www.who.int/classifications/icd/en/

[12] The ICD-10 Interactive Self Learning Tool for ICD-10 is to eventually be translated into Russian so that it can be used as a regional tool

[13] WHOSIS Mortality Database available on http://www.who.int/whosis/mort/download/en/index.html (accessed June 2011)

with 100% completeness[14] and 83% coverage[15] (Mathers *et al.* 2005)[16]. A follow-up study using the same methodology assessed Moldova 2002 cause of death data and it was again found to be of 'high quality' (Mahapatra 2007). An assessment during this mission of the ill-defined causes in 2009 showed only 1.4% total ill-defined disease causes (0.6%) and ill-defined injuries/accidents (0.8%)[17]. All together, these attributes including completeness, coverage and percentage of ill-defined causes of death reflect very good data collection and reporting trends from vital registration data.

The same level of detailed vital statistics by 4-digit coded causes are not available on the MoH and NBS websites; however, both websites provide 20-30 main causes of death annually for several years, with the option available on one or the other sites to analyze by geographic area, urban or rural milieu, by age and sex.

Perinatal deaths. Perinatal indicators are not formally monitored in MDG 4 & 5, but collectively they are an important aspect of mother and child health. The standard definition of a *perinatal death* is a death during the perinatal period, commencing at 22 completed weeks (154 days) of gestation and ending seven completed days after birth (168 hours) (WHO 2008, p. 23). NCHM collects routine information from health facilities on perinatal deaths, using a *Certificate of cause of perinatal* death form (106-2/e, 29 April 2004). The perinatal form 106-2/e deviates from information in the WHO recommended standard form in that it leaves out the collection of: birth weight; timing of death i.e., before labor or during labor; total number of previous births including dead, alive and abortion; type of delivery i.e., normal spontaneous vertex or other, and; the number of antenatal care visits (WHO 2008, p. 110).

Perinatal mortality statistics are available through NCHM website using the DPS software. As with other statistics from the DPS software, the data are available annually and by geographic areas. The perinatal information from NCHM-DPS is confusing, however, because it presents statistics for 1000g+ when the perinatal form does not appear to collect information on birthweight for stillbirths. The perinatal form should be reviewed and updated metadata should be made available. The *2005 Manual de indicatori nationali in assistenta perinatala* is a valuable resource from which policy-makers, program managers and other stakeholders may draw information on a wide range of perinatal indicators, including impact indicators (mortality) as well as medical assistance and morbidity indicators (MOH 2005). A valuable source of information that could potentially shed light on determinants of perinatal mortality in Moldova is the 2010 *Quality of perinatal health care assistance from the Republic of Moldova* (MoH 2010). This is a sample study of knowledge, attitudes and practices focused on quality of care of pregnant women, mothers and newborns. The study presents the perspectives not only of these women regarding the care they received but also the level of knowledge among medical staff in maternities.

Related to perinatal mortality and maternal health, but not finding its official place among perinatal quality indicators or MDG targets, are indicators on abortion. While an assessment of abortion information is beyond the scope of this report, it is nevertheless important information to

[14] Completeness refers to the proportion of all deaths that are registered in the population covered by the vital registration system for a country.

[15] Coverage refers to the total number of deaths reported from the vital registration system for a country divided by the total number of expected deaths in the country. The reason that Moldova shows a relatively lower level of coverage is because deaths in Transnistria are not included.

[16] High quality data is defined as >90% completeness and ill-defined codes appear on <10% of registrations (Mathers et al. 2005, p. 173)

[17] Greenwell used 2009 Moldova vital registration data, available on the WHOSIS Mortality Database, to analyze the percentage of ill-defined causes of death. More information on the method of this assessment is described in AbouZahr *et al*. 2010, pp. 26-27.

monitor given that abortion rates are high in Moldova—about 34% of pregnancies end in abortion (NCPM and Macro 2006), although routine statistics show much lower levels (Govt. of Moldova 2010, p. 69). The MDG Report (2010) did address the abortion situation as well as highlight several challenges with definitions and data quality. The National Strategy for Reproductive Health 2005-2015[18] outlines several objectives to decrease the role of abortion used as a birth control method (p.6), and to reduce the rate of total abortions and repeated abortions (p. 7). It further states that the abortion rate will not exceed 15 per 1000 women of reproductive age (p. 11) (note, the time period for this target was not specifically defined, the assumption is therefore by the end of the Strategy period, 2015). According to the same National Strategy, in 2003, in 37.5 % of the cases, maternal mortality was induced by abortion complications (p.4) (Note, this statistic is based on only a total of eight maternal deaths in that year. For such small numbers, say, under 30, then the absolute number should be reported either instead of or at least together with the statistic). The NCHM collects routine data on the annual number of pregnancies with abortive outcomes, by ICD-10 code. This information is available since 2008; data with more detailed information on the method of abortion and subsequent complications are available as of 2010. Abortion data are broken down by age of woman and her residence (urban/rural).

DATA QUALITY

The purpose of this section is to investigate potential discrepancies, or other issues related to vital registration data, as they pertain to reporting for MDG 4 & 5. The assessment draws mainly upon aggregate information available at central level provided on the NCHM and NBS websites.

Several approaches are undertaken to formulate a judgement on data quality. First, we check the ***reliability*** of the reported *numbers of deaths* by comparing reported numbers from different sources for the same period and area. The less difference between the numbers reported by different reporting sources then the more they are assumed to be reliable, thus bolstering confidence in the absolute numbers being used in subsequent data quality checks. The numbers checked for reliability in this assessment include deaths among infants under 1 year, child deaths between 1 to 4 years, maternal deaths, and live births. These numbers are further verified with those made available in the WHO mortality database.

The second data quality component, ***completeness*** in reporting, is investigated by examining national level infant and under-five mortality rates from different data sources and methodologies, taking into account differences, for example, in definitions, data collection mechanisms, and computations. ***Consistency*** is assessed by exploring annual trends in the number of early deaths by different age periods, including stillbirths during gestation, at subnational levels. In a natural setting devoid of sudden upsets such as civil unrest or natural disaster causing widespread deaths or migration, the numbers of early childhood deaths are relatively stable and are not expected to change drastically over short time periods ie, ±10-15% annually. Unexplained variance outside of this range could indicate anomalies in reporting over time or between locations—for example, if some facilities, especially private ones, are not reporting regularly as required, and/or localized underreporting if providers are not applying the correct application of live birth and omitting deaths at the youngest ages. Finally, ***accuracy*** checks are done by examining ratios of timing of early childhood deaths over time, and comparing the ratios to other countries with similar levels of mortality.

[18] Government of Moldova. 2005. National Strategy for Reproductive Health 2005-2015. Government Decision No. 913 dated 26.08 2005. http://webapps01.un.org/vawdatabase/uploads/Deccision%20No.%20913%20of%202005%20on%20the%20National%20Strategy%20on%20Sexual%20Reproductive%20Health.pdf (accessed 10 August 2011)

In each of the data quality sections-- reliability, completeness, consistency, and accuracy-- issues concerning infant & child mortality will be presented, followed by issues regarding maternal deaths.

Reliability

A simple reliability check may reveal potentially fragmented reporting channels and/or lack of data reconciliation at central level. It also confirms that the data sent annually to WHO correspond to the same body of evidence being used in the country.

The reliability check of infant, child and maternal ***deaths*** shows that there is excellent harmonization and reconciliation of data compilation at the central level (Tables 3a-3c). There is virtually no difference in these numbers from either of the data sources; small differences in deaths among children age 1 to 4 years are due to rounding errors since absolute numbers of deaths were derived indirectly from under-five mortality rates published on-line (whereas absolute numbers for deaths of children under five years are not available).

Table 3a. Accuracy in the number of infant deaths (under 1 year), various sources of data 2003-2009

	2003	2004	2005	2006	2007	2008	2009
NCHM	522	464	468	442	428	473	493
NBS	522	464	468	442	428	473	493
Vital registration (WHOSIS)	522	464	468	442	428	473	493
Discrepancy range	0	0	0	0	0	0	0

Table 3b. Accuracy in the number of child deaths (1-4 years), various sources of data 2003-2009

	2003	2004	2005	2006	2007	2008	2009
NCHM	127	122	120	84	104	89	90
NBS	129	123	122	85	103	91	90
Vital registration (WHOSIS)	128	121	121	85	104	89	90
Discrepancy range (cases)	0-2	0-2	0-2	0-1	0-1	0-2	0

Table 3c. Accuracy in number of maternal deaths, various sources of data 2003-2009

	2003	2004	2005	2006	2007	2008	2009
NCHM	8	9	7	6	6	15	7
NBS	na	na	na	na	na	na	na
Vital registration (WHOSIS) (calculated from MMR and LB)	8	9	8	6	7	17	7
Discrepancy range	0	0	1	0	1	2	0

(cases)							

Sources: NCHM DPS on-line data; NBS on-line data bank; WHO-VR from WHOSIS mortality database (using the ANACoD tool that sums 'maternal conditions' by the Global Burden of Disease list)

The reliability of numbers of live ***births*** is also checked because they are used as denominators in the calculation of early childhood mortality and the maternal mortality ratio. The annual number of live births 1000g and more, from 2003 to 2009, are the same on the NCHM and NBS on-line data banks (Table 4).

Table 4. Accuracy in the number of live births 1000g+, various sources of data 2003-2009

	2003	2004	2005	2006	2007	2008	2009
NCHM 1000g+	36471	38272	37695	37587	37973	39018	40803
NBS 1000g+	36471	38272	37695	37587	37973	39018	40803
Discrepancy range (cases)	0	0	0	0	0	0	0

Sources: NCHM DPS on-line data; NBS on-line data

The NCHM-DPS data, however, reveal discrepancies in reporting the number of live births 500g and more versus the number 1000g and more. Logically, the number of live births 500g + would exceed the number 1000g+. While this is indeed the case for Chisinau and Balti municipalities, statistics from all of the rayons show a higher number of live births 1000g + than 500g+. This anomaly may indicate a reversal in definitions, or local misunderstanding in the application of the definition. Moreover, NCHM-DPS provides data for another indicator of births, '*numar nasteri*'. Compared to the statistics for *numar nasteri* at rayon level, the live births 1000g+ are on the order of 20-30% higher. Although neither of these discrepancies affect results in this data quality assessment (because only live births 1000g+ are used in the denominator), the issue is raised again when reviewing Targets (see next section). The discrepancies regarding the number of live births by weight category, and deaths to infants in these categories, should be investigated and, if deemed important to disseminate, then should be corrected or explained with adequately detailed metadata.

Completeness

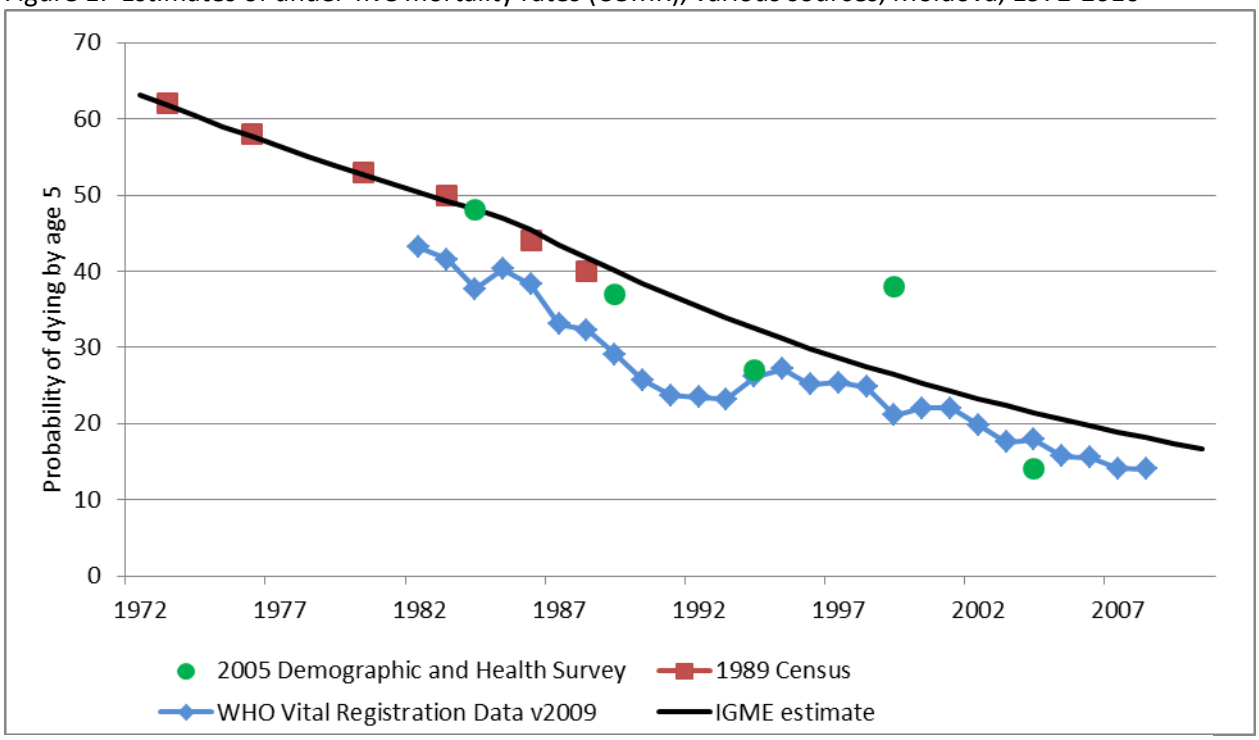
There are three main data sources that provide information on MDG 4: the vital registration system that records births and deaths; the population censuses of 1989 and 2004 which used questions for women on numbers of children ever born alive and children still alive (known as a summary birth history) to produce indirect estimates of infant and child mortality; and the 2005 Demographic and Health Survey, a population-based household sample survey which uses information from a full birth history to produce direct estimates of early childhood mortality. All of these sources have strengths and weaknesses in their measurement potential; triangulating the estimates reveal further attributes of the data.

Figure 1 shows the ***under-five child mortality (U5CM)*** estimates from each of these sources, as well as the fitted estimates from the Inter-Agency Group on Mortality Estimates (IGME) that takes into account all sources of information to fit a line (UNICEF *et al.* 2007)[19]. Overall, there is good

[19] in 2004, in order to agree on the best way to calculate internationally comparable indicators of infant and child mortality levels and trends, the United Nations Children's Fund (UNICEF), The World Bank, the World Health Organization (WHO), the United Nations Population Division (UNPD) and members of the academic community joined together to form the Inter-agency Group for Child Mortality Estimation (IGME). Their

comparability between the trends, although levels are not consistent between sources. In particular, this assessment focuses on estimates derived from the vital registration system because they are the ones used to produce the official estimates to track infant and child mortality trends. The vital registration estimates are consistently below those from other sources, although since about 1994 they converge toward survey estimates and fall within the lower range of the uncertainty limits as estimated by IGME. A similar pattern of estimates are seen for *infant mortality rates* (IMR) from these sources. For IMR estimates and uncertainly limits for IMR and U5MR, see the IGME Child Mortality Estimates website (http://www.childmortality.org/2.0/)

Figure 1: Estimates of under-five mortality rates (U5MR), various sources, Moldova, 1972-2010



Note: indirect estimates derived from the 2004 census were not available on the IGME child mortality estimates website, and therefore not plotted.
Source: data from www.childmortality.org/2.0/ (accessed 6 July 2011)

The differences in levels bring to light an important difference in methodologies between early childhood mortality estimates from population-based surveys, such as MICS and DHS, and estimates from the vital registration. In surveys, interviewers are trained to probe for and record all live births regardless of weight of the live birth. In vital registration, the estimates take into account live births, and deaths to live births 1000g and over. Let us explore this in more detail.

Prior 2008, Moldova used a soviet definition of live birth[20]. Since January 1, 2008, however, the definition for reporting and recording a ***live birth*** in vital registration is stated to correspond with the standard international definition for live birth (see NBS metadata, 2010, Appendix C1 & C2)[21].

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database, the Child Mortality Estimates (CME) database, provides data for the under-five mortality rate (U5MR) and the infant mortality rate (IMR), including for Moldova
http://www.childmortality.org/cmeMain.html

[20] The Soviet era-definition uses breathing as the sole indicator of life. Under the Soviet definition, moreover, infants who are born before 28 weeks of gestation, who weigh less than 1,000 grams, or who are less than 35 centimetres long are not considered live births unless they survived for seven days. Definition from the Beyond Transition newsletter, quoted in http://www.gfmer.ch/Medical_education_En/Live_birth_definition.htm (accessed 26 July 2011).

Live birth: the complete expulsion or extraction from its mother of a product of conception, irrespective of the duration of the pregnancy, which, after such separation, breaths or shows any other evidence of life, such as the beating of the heart, pulsation of the umbilical cord, or definite movement of voluntary muscles, whether or not the umbilical cord has been cut or the placenta is attached (ICD-10 Vol.2 2008, p 152)

Furthermore, based on a discussion with MoH, there are high level of adherence to the international reporting criteria to include in the vital statistics, "all fetuses and infants weighing at least 500 g at birth, whether dead or alive" (WHO 2008, p. 154). Evidence that this is put into practice in Moldova is shown in the statistics available on the NCHM website by weight categories 500g-999g and 1000g+, notwithstanding the issue with the reliability of live births mentioned above. In terms of calculating indicators for national tracking and for international comparison Moldova also adheres to international recommendations[22]:

"In statistics for international comparison, inclusion of the extremely low-birth-weight group disrupts the validity of comparisons and is not recommended. […] Countries should also present statistics in which both the numerator and denominator of all ratios and rates are restricted to foetuses and infants weighing 1000 g or more…" (WHO 2008, p 154).

Hence, we may examine the differences in infant and under-five child mortality rates when taking into account the low-birth weight group (500-999g+) versus the 'weight-specific groups' (1000g +). An internal source of data from the NCHM used for administrative purposes was made available for the mission, providing the annual number of infant deaths subdivided into deaths of infants weighing 500-999g at birth, deaths of infants weighing 1000g+ at birth, for the years 2002 to 2006. These data show that about 65-70% of infant deaths occurred to live births 1000g+, which means that about a third of infant deaths occurred among live births of very low weight and, by definition, are not reflected in the internationally comparable statistics (per international recommendations to maintain validity across countries). Similarly with under-five deaths, about 25-30% occur among very low-weight live births (Table 5). Estimates from vital registration that take into account the low-birth weight groups are roughly the same as the IGME estimates and fall closer to the level of estimates from surveys, which take into account live births regardless of weight.

Table 5. Proportion of infant and child deaths among births 1000g or more, and the Infant mortality and Under-five child mortality differentials, 2002-2006

	Number of deaths <1 year			Infant mortality rate*	
Year	1000g + (weight specific)	500g+	Proportion deaths 1000g+	1000g+	500g+
2002	528	765	0.69	14.7	21.4
2003	522	771	0.68	14.3	21.1
2004	464	724	0.64	12.1	18.9
2005	468	721	0.65	12.4	19.1
2006	442	697	0.63	11.7	18.5
	Number of deaths < 5 years			Under-five mortality rate*	

[21] It is not clear how this revised definition is used to produce official indicators. See further discussion on this issue in the Targets section of this report.

[22] There seem to be misunderstandings with target-setting and reporting on MDGs, however; see section on 'Targets'.

2002	651	891	0.73	18.2	24.9
2003	650	895	0.73	17.8	24.5
2004	585	843	0.69	15.3	22.0
2005	589	842	0.70	15.6	22.3
2006	527	780	0.68	14.0	20.8

* All IMRs and U5MRs are calculated with live births 1000g+ in denominator
Source: NCHM-DPS on-line data, except data for the number of deaths 500g+ which is obtained directly from NCHM

The main source of data for tracking MDG 5, improving ***maternal health***, is physician certified cause of death data that is collected by the MoH. The MoH is responsible for tracking these deaths and producing the maternal mortality ratio. Discussions with specialists from the MoH confirmed a detailed knowledge of the application of the international definition of maternal mortality.

> *"A maternal death is the death of a woman while pregnant or within 42 days of termination of pregnancy, irrespective of the duration and the site of the pregnancy, from any cause related to or aggravated by the pregnancy or its management, but not from accidental or incidental causes" (WHO 2008, p.157).*

Evidence that this definition is applied, however, is not clear to the general user because the definition and metadata pertaining to maternal mortality is not available on-line with the NCHM-DPS maternal mortality data. NBS publishes metadata for the maternal mortality ratio[23], but it does not provide the full standard definition of maternal mortality (Appendix 3C).

WHO recommends that late maternal deaths and pregnancy-related deaths be captured on the *death registration form;*[24] however, the recommended revision for late maternal deaths was considered by the national experts not to be worth including because there are so few maternal deaths, and even rarer are deaths due to maternal causes after 42 days following termination of pregnancy.

> *"Late maternal death is the death of a woman from direct or indirect obstetric causes more than 42 days but less than one year after termination of pregnancy" (WHO 2008, p.157).*

> *"A pregnancy-related death is the death of a woman while pregnant or within 42 days of termination of pregnancy, irrespective of the cause of death" (WHO 2008, p.157).*

Such revisions would also permit monitoring of pregnancy-related deaths, and the proportion of these deaths to maternal deaths. Figures 2a and 2b show examples of death certificates from the United States and from Turkey that include the recommended revision (see Appendix B1 and B2 for full death certificate).

[23] Although NBS does not publish maternal mortality data in its on-line data bank, it publishes on maternal mortality in Statistical compilations POPULATION AND DEMOGRAPHIC PROCESSES IN THE REPUBLIC OF MOLDOVA, Women and men in the Republic of Moldova
http://www.statistica.md/pageview.php?l=ro&idc=350&nod=1 &

[24] "In order to improve the quality of maternal mortality data and provide alternative methods of collecting data on deaths during pregnancy or related to it, as well as encourage the recording of deaths from obstetric causes occurring more than 42 days following termination of pregnancy, the 43rd World Health Assembly in 1990 adopted the recommendation that countries consider the inclusion on death certificates of questions regarding current pregnancy within one-year preceding death" (WHO 2008, p.158).

Figure 2a. Extract from Turkey death certificate

G	If female	☐	Death occurred during pregnancy	☐	Death occurred during delivery	☐	Death occurred within 42 days after pregnancy
		☐	Death occurred between 43 and 365 days after pregnancy			☐	Not maternal mortality

Figure 2b. Extract from US death certificate

36. IF FEMALE:
☐ Not pregnant within past year
☐ Pregnant at time of death
☐ Not pregnant, but pregnant within 42 days of death
☐ Not pregnant, but pregnant 43 days to 1 year before death
☐ Unknown if pregnant within the past year

WHO further recommends that maternal deaths be subdivided into two groups, direct obstetric deaths and indirect obstetric deaths (WHO 2008, p.158):

> *Direct obstetric deaths*: those resulting from complications of the pregnant state (pregnancy, labor, puerperium), from interventions, omissions, incorrect treatment, or from a chain of events resulting from any of the above.
>
> *Indirect obstetric deaths*: those resulting from previous existing disease or disease that developed during pregnancy and which was not due to direct obstetrical causes, but which was aggravated by physiological effects of pregnancy

The CMNS-DPS subdivides deaths into three broad categories of maternal deaths, including indirect, abortion-related, and other direct causes. As with other statistical data available in DPS, the information is available annually and by geographical areas. The metadata should also be available on-line and include definitions of the main subdivisions, which include the two groups recommended by WHO.

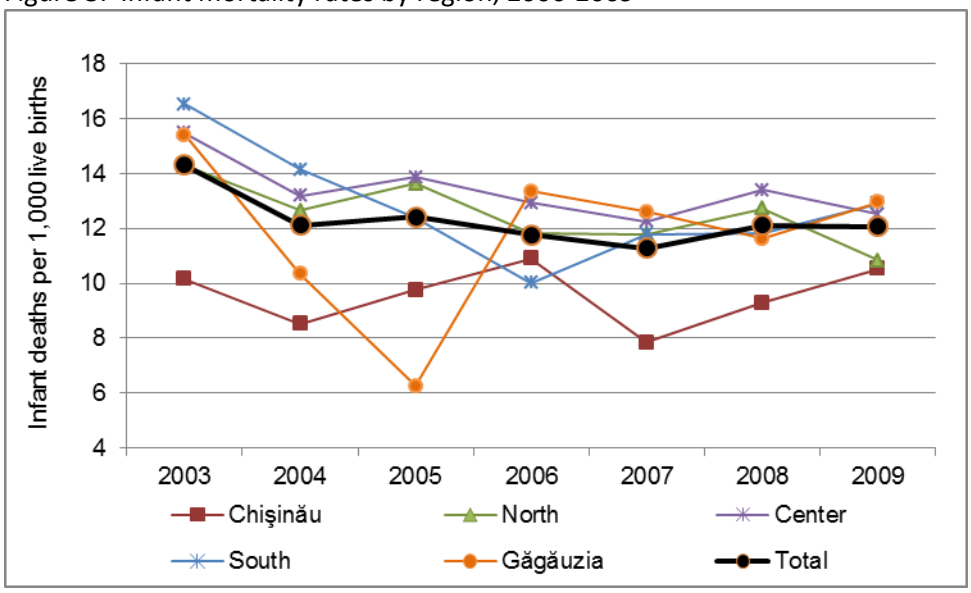
In order to ensure the accurate classification of each maternal death, and to investigate the circumstances surrounding each death, the MoH established an expert Commission to investigate the circumstances of each maternal death. While this level of attention serves to clarify the circumstances of the death and possibly contribute to avoiding future deaths, the process does not facilitate capturing maternal deaths that may have been misclassified as non-maternal deaths among women of reproductive age. Since physicians may misclassify maternal deaths as some another cause, deliberately or not, the Committee may consider following up on all deaths of women of reproductive age, or a sample of these deaths (almost 1500 deaths to women of reproductive age were reported in 2009). The Turkey MoH, for example, provides a good model as it has moved from conducting costly Reproductive Age Mortality Survey (RAMOS) studies to implementing a continuous, decentralized maternal surveillance system to ensure the most complete and accurate data possible on maternal deaths. The establishment of this maternal surveillance system is described in the 2005 Turkey National Maternal Mortality Study (Hacettepe

2005, p.89-120). An exchange visit could be arranged whereby experts from Moldova MOH visit Ankara to learn about the surveillance system.

Consistency

Figure 3 plots annual ***infant mortality rates*** by regions, from 2003 to 2009. Looking at the differentials in rates there does not appear to be substantial difference between regional levels, except for Chisinau and Gagauzia. Since 2004, most IMRs fall between 12 to 14 deaths per 1,000 live births, except for Chisinau which is consistently lower, as expected.

Figure 3. Infant mortality rates by region, 2006-2009



Source: NCHM-DPS on-line data

In general, within regions, the proportion of deaths among live births is expected to be fairly even across time, typically not exceeding ±10-15% from one year to the next. A radical increase or decrease in infant mortality rates within a region flags potential problems in reporting. If such deviations exist then an explanation should be sought. Table 6 checks the consistency of each estimate in Figure 3 by applying the ±15% criteria from year to year; a cell with '0' means the annual deviation falls within the specified range, and a cell with '1' means the annual deviation falls outside of the range. Most estimates do not deviate beyond ±15% from year to year, with the exception of Gagauzia (2004, 2005), Chisinau (2005, 2006) and the South (2005). Again, estimates for these years should be investigated further to determine if they are 'explainable, justifiable fluctuations', or, for example, if there was underreporting in that period. None of the national estimates fluctuate radically which shows that subnational variations did not unduly effect national levels.

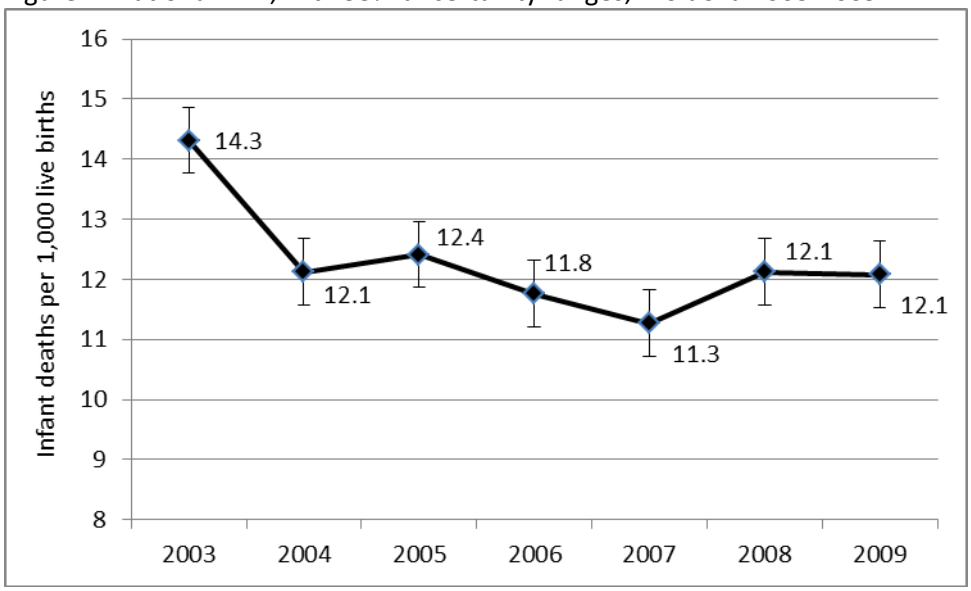
Table 6. Regions with greater than or less than 15% deviation in IMR from year to year, 2003-2007

	IMR 2003	IMR 2004	IMR 2005	IMR 2006	IMR 2007	Percentage with >15% deviation from year to year
Chişinău	0	0	1	1	0	60.0%
North	0	0	0	0	0	100.0%
Center	0	0	0	0	0	100.0%
South	0	0	1	0	0	80.0%
Găgăuzia	0	1	1	0	0	60.0%
Total	0	0	0	0	0	100.0%

Note: a cell with '0' means the annual deviation falls within the specified range, and a cell with '1' means the annual deviation falls outside of the range
Source: NCHM-DPS on-line data

The amount of variation that is reasonably acceptable to determine a 'significant difference' between estimates is largely a judgment call. In the 2005 DHS survey, due to the complex sample design and its effect on sample variations, the relative error for the national IMR, over a 5-year period, was about 24 percent (NCPM and Macro 2006, p. 242). This translates into an IMR of 12.8 for the 5-year period prior to the survey, with wide confidence intervals between 6.8 and 18.9. In a probability sample such is used in the DHS, the sampling errors can be statistically calculated and estimates reported with a known precision. In vital registration, however, deviations from the 'true' value is due to systemic errors about which little may be known. Ignoring potential error, however, may result in erroneous interpretation of estimates or/and trends. As a simple simulation of systemic fluctuation, we calculate 95% uncertainty intervals using the binomial formula for proportions. This formula takes into account the number of live births, the proportion of deaths, and a defined error margin of 5 percent. For IMR estimates from 2003[25] to 2009, this translates into error bars between ±0.53 and ±0.61 deaths per 1,000 births for each annual estimate (Figure 4). Using these criteria, we see from the most oscillations that most values are not significantly different from the other, that is, their errors bars overlap. The exception is the 2003 estimate, which shows that estimates for subsequent years are significantly lower. It also appears that the 2007 estimate may be significantly lower than 2005. The point of this exercise is to emphasize caution in over-interpreting fluctuations that may be due to systemic reasons rather than showing meaningful differences.

Figure 4. National IMR, with 95% uncertainty ranges, Moldova 2003-2009

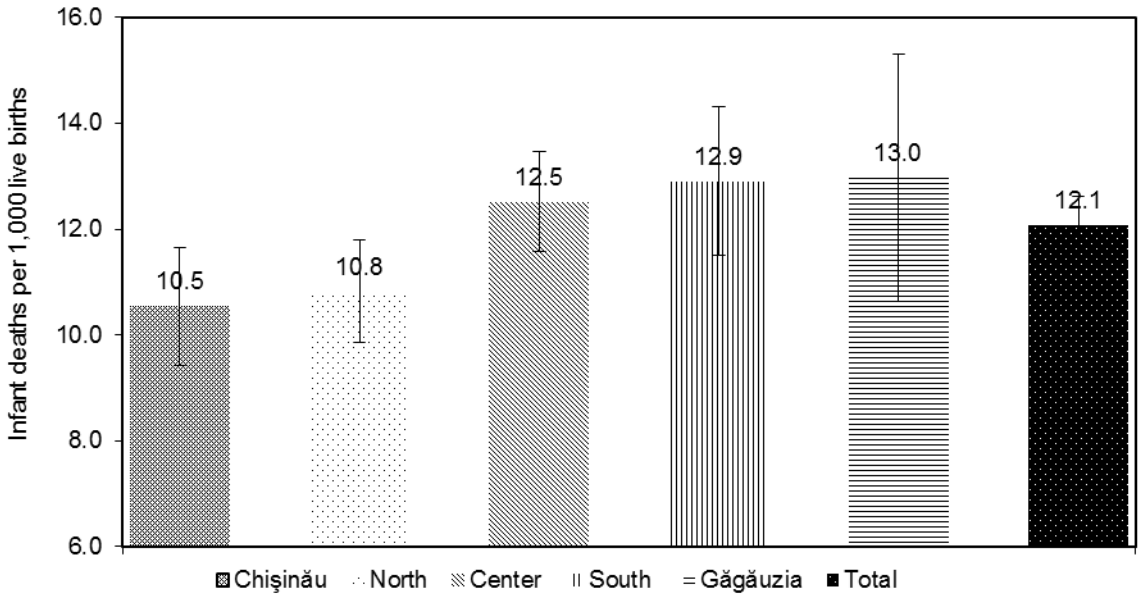


Source: NCHM-DPS on-line data

Taking a closer look at the most recent IMR figures available by region in 2009, and applying the same formula to estimate 95% uncertainty ranges, there do not appear to be significant differences between regional IMRs (Figure 5). Even between regions with the largest difference in IMR, Chisinau (10.5) and Gagauzia (13.0), the error bars overlap indicating that they are probably not significantly different. (Note that Gagauzia has relatively large uncertainty range due in part to a smaller number of births in that region.)

[25] Most data assessment uses data available in NCHM-DPS, which provides data back to 2003.

Figure 5. Infant mortality rates by region, with 95% confidence intervals, Moldova 2009



Source: NCHM-DPS on-line data

In terms of the ***maternal mortality ratio***, the number of annual maternal deaths is very low, usually fewer than 10 per year over the past decade. With these low numbers, and the fact that the indicator is expressed per 100,000 live births, the result is that the level of maternal mortality looks erratic from year to year—but with differences that are not as drastic as they might seem. For example, from 2007 to 2008, the MMR increased 143% (Table 7 and 7a). However, if we momentarily regarded the measurement scale for the indicator per 1,000 live births, for example, like childhood mortality measures, the difference is only 0.16 to 0.40 maternal deaths per year—both less than half a death per 1,000 live births. While even 10 maternal deaths is an important number for public health and program management, for purposes of tracking the indicator's real progress it would be better to evaluate a smoother trend. There appears already to be agreement within the MoH already that a 3-year moving average would be more useful to assess progress (Figure 6).

Table 7. Maternal mortality ratios, annual averages, and the percent change between years, 2003-2009

	2003	2004	2005	2006	2007	2008	2009
MMR (annual)	21.9	23.5	18.6	16.0	15.8	38.4	17.2
% annual change		*7.3*	*-20.9*	*-14.0*	*-1.2*	*143.0*	*-55.2*

Source: NCHM-DPS on-line data

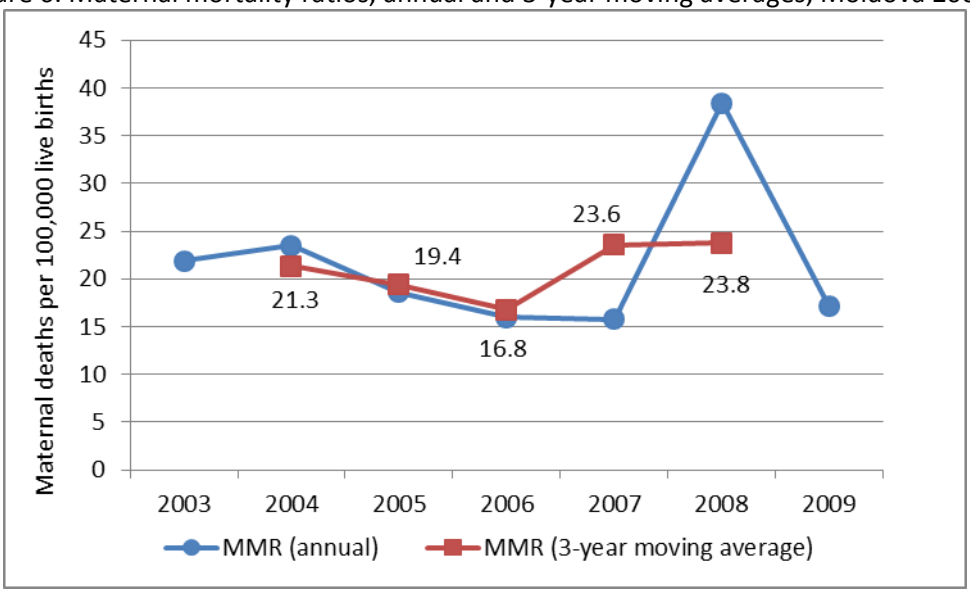
Table 7a. Maternal mortality ratios, 3-year moving averages, and the percent change between periods, 2003-2009

	2003-2005	2004-2006	2005-2007	2006-2008	2007-2009
MMR (3-year moving average)	21.3	19.4	16.8	23.6	23.8
% change	*-9.1*	*-13.4*	*40.3*	*0.9*	*-9.1*

Source: NCHM-DPS on-line data

In terms of detecting a 'real decline' in maternal mortality it is not practical to apply the same formula for uncertainty ranges. This is because the binomial distribution for proportions does not work well when the proportion is so small, as with maternal mortality (e.g., 0 .000238 for 2007-2009). Progress in maternal health is best assessed with quality indicators and by the Commission investigating circumstances surrounding each death, both of which are currently happening and should continue.

Figure 6. Maternal mortality ratios, annual and 3-year moving averages, Moldova 2003-2009



Source: NCHM-DPS on-line data

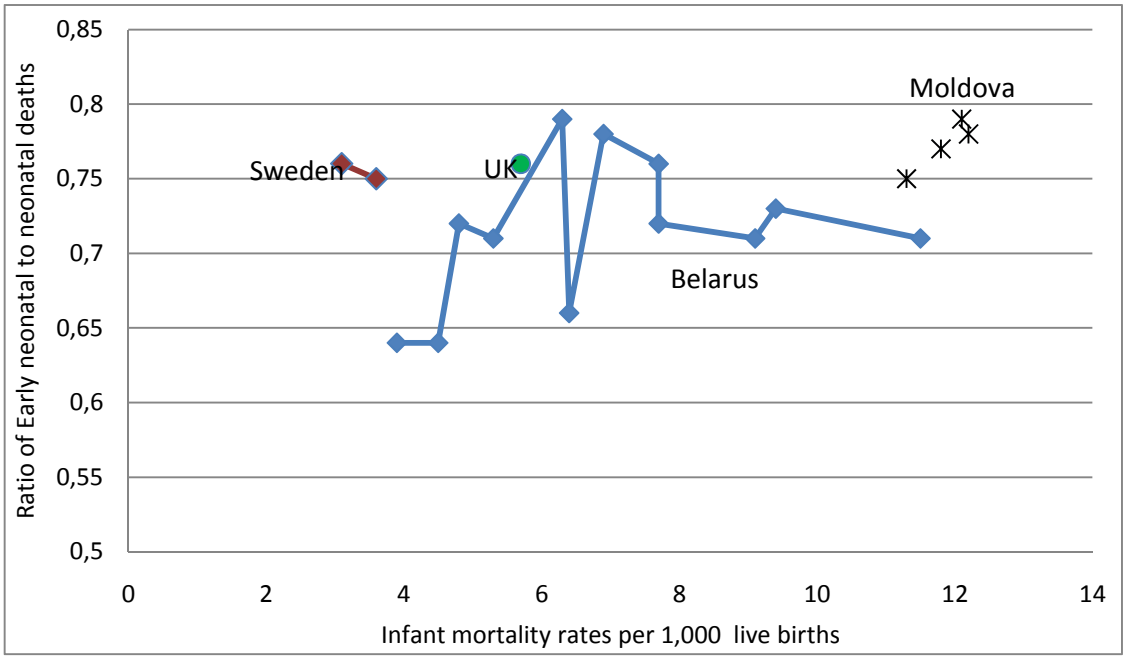
Accuracy

Evidence of accuracy of statistics lends credibility to conclusions. Inherent to some extent in most vital registration systems is underreporting of early deaths, especially those that happen in the first hours and days of life. Although it is difficult if not impossible to enumerate unreported early deaths *a posteriori*, it is possible to determine if there might be substantial underreporting of early deaths. (The following assessment is based on a similar analysis conducted in 2010 in Belarus to try and determine potential underreporting of early deaths[26].)

Empirical data has shown that the proportion of early neonatal deaths (ENN, death that occurs in the first 7 days of life), and the proportion of infant deaths that occur in the neonatal period (NNM, death in the first 28 days of life) are empirically related to the overall level of the infant mortality rate. From Hill and Choi (2006, p. 435), we may reasonably conclude that, as rule of thumb, the ratio of ENN to NNM should roughly be 75-85% when levels of IMR are below 20 per 1000 live births. Figure 7 shows the ratio of early neonatal deaths to neonatal deaths for four countries. The ratios for Sweden and England-- with low IMR and a high level of completeness in their vital registration system and therefore deemed to be good 'standards',-- do not fall below 75%. The ratios for Moldova are similarly high, 75-79%, indicating that early neonatal deaths are not being systematically omitted (Belarus shows signs of potential omissions since given low ratios for most observations).

[26] Statistics on Child Mortality in the Republic of Belarus, An Assessment of Data and Recommendations to IGME. Mission report by Kenneth Hill, May 2011.

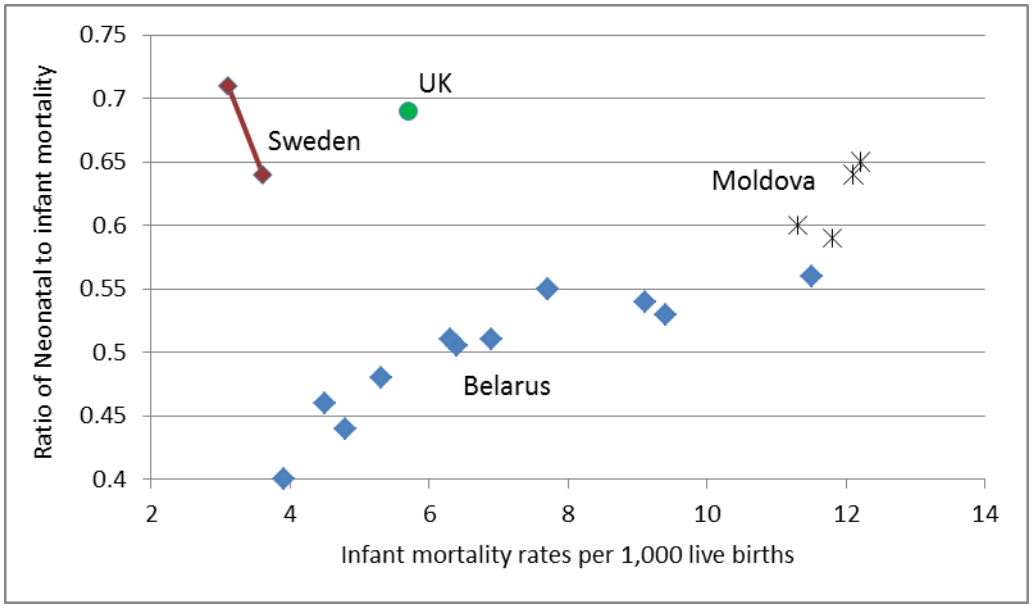
Figure 7. Ratios of Early Neonatal Deaths to Neonatal Deaths by Level of Infant Mortality: Belarus (1999-2010), England (1999), Moldova (2006-2009) and Sweden (1998, 2004)



Source: NCHM-DPS data for Moldova; other data provided by Ken Hill (Belarus mission report 2011)

Figure 8 plots ratios of neonatal mortality to all infant mortality, against infant mortality rates. This shows that, relative to England and Sweden, Moldova has relatively higher postneonatal mortality to neonatal mortality, which brings the ratio downward. This is, however, consistent with also having higher infant mortality rates, where a relatively higher risk of dying extends beyond the early neonatal period into the neonatal period. Again, as a rule of thumb from Hill and Choi (2006, p. 436), for low levels of infant mortality such as those associated with these observations (IMR<20), with complete reporting the ratio should not drop below 0.50. Results of this assessment using Moldova data show the ratio of neonatal mortality to infant mortality is within the expected range.

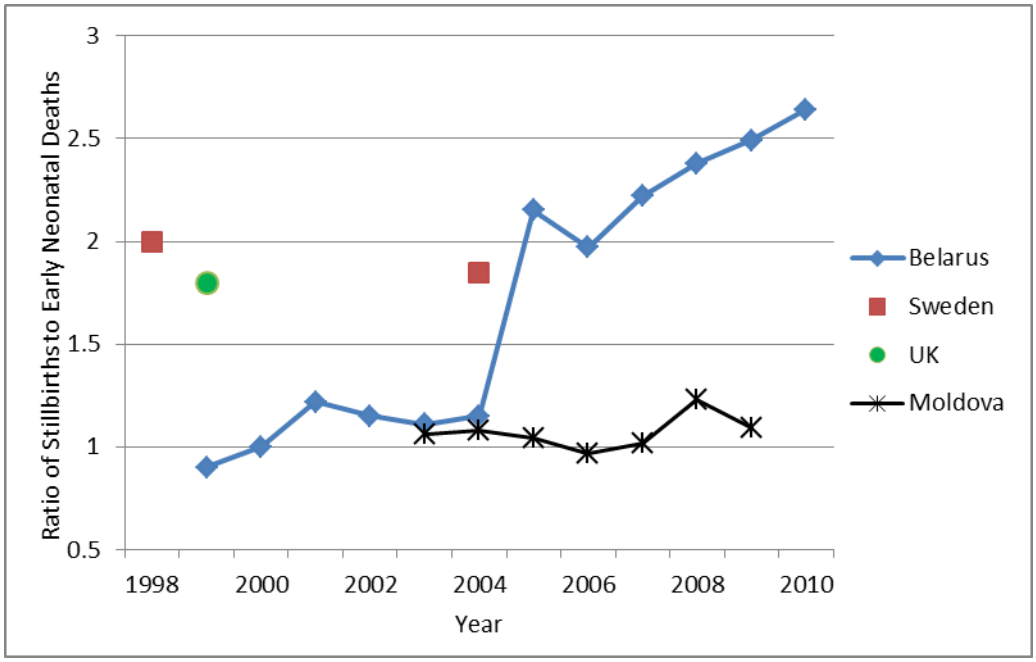
Figure 8. Ratios of Neonatal Mortality to Infant Mortality by Level of Infant Mortality: Belarus (1999-2010), England (1999), Moldova (2006-2009) and Sweden (1998, 2004)



Source: NCHM-DPS on-line data for Moldova; Hill 2011

Figure 9 plots the ratios of stillbirths to early neonatal deaths. The ratios for Moldova are consistently lower than most of the other observations. While England, Sweden and the most recent Belarus estimates all show around double or more the number of stillbirths compared to early neonatal deaths, Moldova has around the same number of both. Since none of the data quality components assessed previously show anomalies, these results suggest there might be a problem with completeness in reporting fetal deaths. The reasons for relatively small number of stillbirths compared to early neonatal deaths should be investigated sub nationally, among reporting entities completing the perinatal form. The 2005 DHS also showed close about three stillbirths to one early neonatal death, which is further reason to conclude that stillbirths are underreported in the vital registration system (NCPM and Macro 2006, p.109). (Note that there is a slightly different definition used in DHS methodology compared to vital registration, but this should not account for a large difference in the stillbirth to early neonatal ratios.)

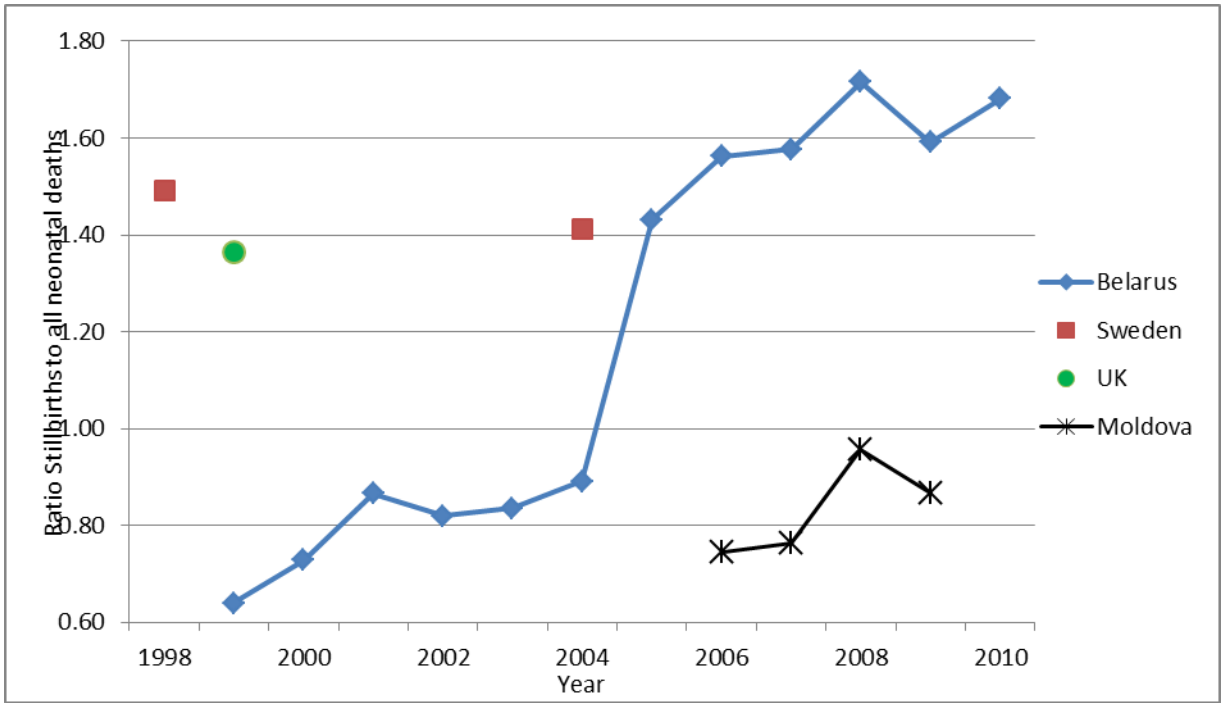
Figure 9. Ratios of Stillbirths to Early Neonatal Deaths by Year: Belarus (1999-2010), England (1999), Moldova (2003-2009) and Sweden (1998, 2004)



Source: NCHM-DPS on-line data for Moldova; Hill 2011

Figure 10 plots the ratios of stillbirths to all neonatal deaths and, as expected, shows similar results as above. That is, while other observations show 40% or more stillbirths than neonatal deaths, in Moldova the quantities are reversed. As above, this indicates a potential problem with completeness in reporting fetal deaths. The reasons for relatively small number of stillbirths compared to early neonatal deaths should be investigated sub nationally, among reporting entities completing the perinatal form.

Figure 10. Ratios of Stillbirths to All Neonatal Deaths by Year: Belarus (1999-2010), England (1999), Moldova (2003-2009) and Sweden (1998, 2004)



Source: NCHM-DPS on-line data for Moldova; Hill 2011

MDGS 4 & 5 TARGETS AND TRACKING

Millennium Development Goals (MDG) are international development goals agreed on by UN member states to achieve by the year 2015. They were officially established during the Millennium Summit in 2000. The international MDG targets for health are[27]:

MDG 4, to reduce child mortality, sets a target of reducing the under-5 mortality rate (U5MR, the probability of dying by age 5 per 1,000 live births) by two-thirds by the year 2015 from a baseline in 1990. This target requires that U5MR declines on average by 4.4 percent annually.

MDG 5, to improve maternal health, sets a target of reducing the maternal mortality ratio (MMR, maternal deaths per 100,000 live births) by three-fourths by the year 2015 from a baseline in 1990. This target requires that MMR declines on average by 5.5 annually.

MDG 4

In most countries deaths under one year comprise over half of all under-five deaths. Given this nested relationship of infant mortality as the major component of under-five mortality, the international community tracks just one of these indicators, the under-five mortality rate. International partners, including UNICEF, WHO, World Bank and the UN Population Division, define progress of MDG 4 in the following way: a country (or region) is considered "on track" if under-five mortality is less than 40 deaths per 1,000 live births or if under-five mortality is at least 40 deaths per 1,000 live births *and* that average annual rate of reduction is at least four percent; "insufficient progress" indicates that under-five mortality is at least 40 deaths per 1,000 live births and that the average annual rate of reduction is at least one percent but less than four percent (cited in UNICEF et al. 2010, p. 7). According to this international definition-- because Moldova's under-five mortality rates have been under 40 since the 1990s-- Moldova is considered to be on track to achieve the international MDG target of 12 by 2015[28].

In addition to the international MDG 4 target, in 2005 Moldova set its own national targets for MDG 4, including targets for infant and under-five mortality, using 2002 as the baseline. These national targets were later revised using a new baseline in 2006, in anticipation of implementing a new definition of live birth to include live births from 500g (Govt. of Moldova 2005, 2010). The original and revised national targets for infant mortality and under-five mortality are plotted below, alongside the observed values cited from the same source.

MDG 4. Target 1: Reduce infant mortality rates

TARGET 1 (2005): Reduce the infant mortality rate from 14.7 in 2002, to 12.1 in 2006, to 9.6 in 2010, and 8.4 in 2015 (Govt. Moldova 2005, p. 37).

TARGET 1 (2010): Reduce the infant mortality rate from 18.5 in 2006, to 16.3 in 2010, and 13.2 in 2015 (Govt. Moldova 2010, p. 56).

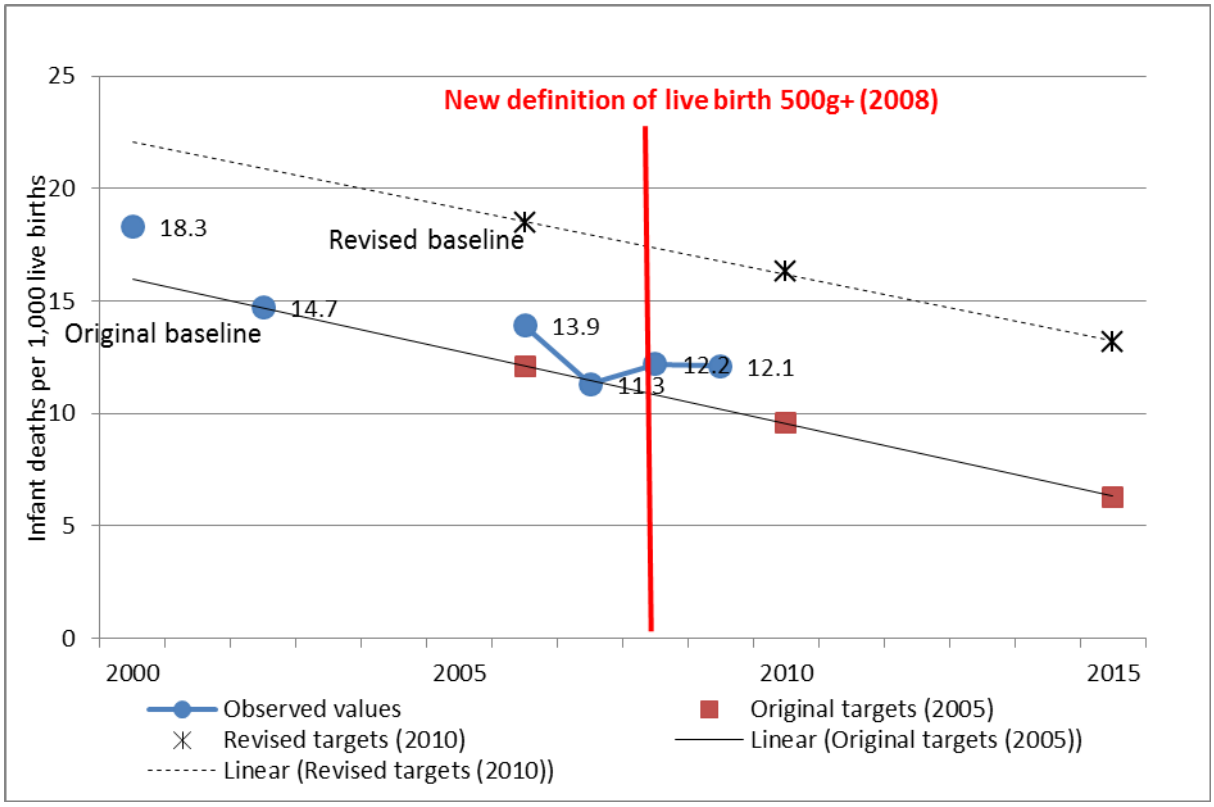
[27] http://www.un.org/millenniumgoals/

[28] The international MDG baseline for the under-five mortality rate in Moldova, in 1990, was 37 deaths per 1,000 live births; in 2009 it was assessed at 17 deaths per 1,000 live births. The annual rate of reduction between 1990 and 2009 is 4.1 percent. The international Millennium Goal target for Moldova, for 2015, is 12 (UNICEF et al. 2010, p. 14).

These targets plotted in Figure 11 reveal that the infant mortality targets for 2010 and 2015 were defined as the values that fall on the linear slopes from their original or revised baseline. After the targets were revised for 2006, 2010, and 2015, however, it was discovered that the observed levels did not increase as it was assumed (only a small, likely insignificant increase is seen in 2008-2009) and that the revised targets had already been met. It was suggested in the 2010 MDG report (cited on p. 57) that "*the Ministry of Health should commit to maintaining the infant mortality rate at the levels already achieved, preventing them from increasing either in the medium or the long term.*"

Figure 11 illustrates the evolution of original targets, revised targets, and observed levels as presented in the Second Millennium Goals Report (Govt of Moldova 2010, pp. 56-57). The description in the report of the method of target setting, and ensuing revisions does not provide the reader with a clear picture, mainly due to moving (revised) targets, a plethora of numbers and decimal points in the text, and terminology that is not sufficiently clear to distinguish between observed baseline and targeted values[29].

Figure 11. Evolution of infant mortality targets in Moldova, 2002-2015



Source: of Moldova 2005; Govt. of Moldova 2010

Furthermore, in terms of the observed IMR levels cited in MDG Reports 2005 and 2010 and plotted in Figure 11, Greenwell verified these values and found that they match those calculated using live births 1000g+, and not using 500g+ as described in the report. There are several reasons for drawing this conclusion. First, the levels from the MDG reports match those available from the NCHM website (±0.1 infant death per 1,000 live births), and those on the website are calculated using live births 1000g+. Second, as seen in Table 5 in this report, the IMR levels calculated using

[29] For example, the 2006 value of 13.9 is a 'corrected figure' according to the text (Govt of Moldova 2010, p.57). The author assumes this is an observed value but was unable to verify it using the NCHM-DPS data.

deaths among live births 500g+ would be substantially higher-- around 19 per 1,000 live births instead of 12. Third, as mentioned above in the data quality assessment section, experts at MoH adhere to WHO recommendations for reporting criteria quoted on page 11 of this report (*ref.* WHO 2008, p. 154). It is further noted that the calculation formula specified in the IMR metadata was not employed to produce the observed estimates. That is, instead of using a 2-year moving average as the formula indicated in the metadata (see Appendix C2), the IMR is calculated as infant deaths in a calendar year divided by births in the same calendar year (author's calculations using data from NCHM-DPS). Whichever formula is used, the metadata should reflect the actual methodology being employed, and vice versa. Finally, as assessed earlier in the data quality section, the information on live births 1000g+ from NCHM-DPS does not reveal issues with quality while, on the other hand, the data on the website for live births 500g+, and *numar nasteri*, show substantial anomalies. There are no data available from NCHM-DPS on the number of infant deaths among live births 500g+, so the source of the data used in the MDG Reports was not available for verification. If these data are to be used in official calculations then they should be among the data routinely available to users.

This review of IMR tracking situation in Moldova suggests that it is important to adequately monitor observed levels of IMR. To adequately monitor, efforts should be made to ensure that the metadata and the actual generation of indicators are synchronized, and that the quality of data used to generate indicators is verified and made available to users from NCHM-DPS. It should further be kept in mind that evaluating real progress, that is, ascertaining significance changes between annual IMR levels, becomes more difficult to monitor when IMR levels are low, as they are in Moldova. It is therefore important that annual changes be assessed in light of reasonable ranges of uncertainty, such as shown earlier in Figure 4. Finally, if specialists at MoH maintain than target-setting is a necessary aspect of monitoring progress, then they may consider alternate methods of projecting targets to the current method of using a linear projection (see discussion on Target-setting below).

MDG 4, Target 2: Reduce under-five mortality rates

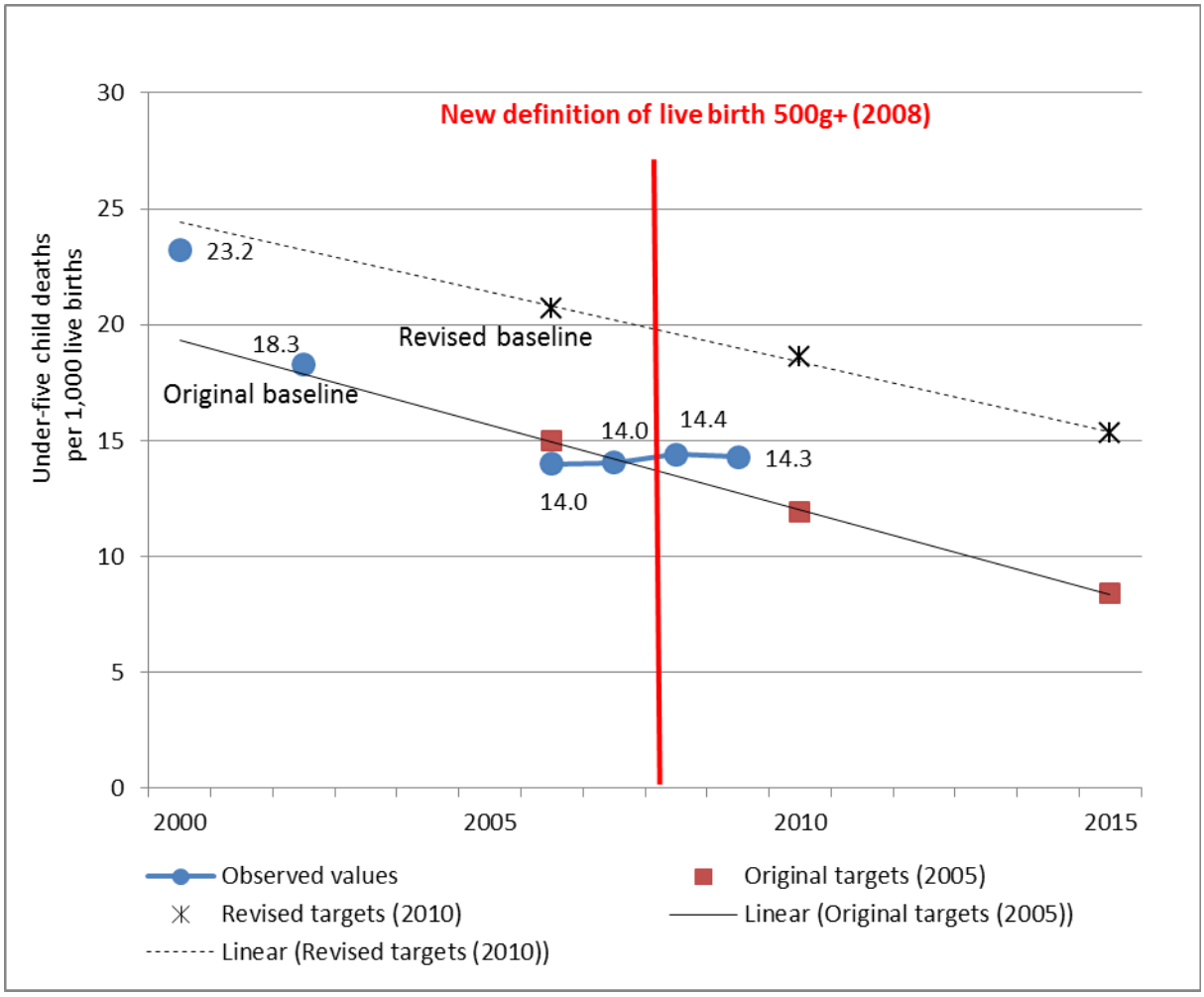
TARGET 2 (2005): Reduce the under-five child mortality rate from 18.3 in 2002, to 15.0 in 2006, to 11.9 in 2010, and 8.4 in 2015 (Govt. Moldova 2005, p. 37).

TARGET 2 (2010): Reduce the under-five child mortality rate from 20.7 2006, to 18.6 in 2010, and 15.3 in 2015 (Govt. Moldova 2010, p. 58).

The scenario for under-five mortality levels and targets is similar to that of infant mortality. Figure 12 shows that the under-five mortality targets for 2010 and 2015 were defined as the values that fall on the linear slopes from their original or revised baseline. After the targets were revised for 2006, 2010, and 2015, however, it was discovered that the observed levels did not increase as it was assumed that the revised targets had already been met. It was suggested in the MDG report (2010, p. 58) to *"consider maintaining the indicator at its current level and come up with a mechanism for preventing its increase and aiming at its further gradual reduction."*

Figure 12 illustrates the evolution of original targets, revised targets, and observed levels as it is described in the Second Millennium Goals Report (Govt of Moldova 2010, pp. 58-59).

Figure 12. Evolution of under-five child mortality targets in Moldova, 2002-2015



Source: Govt. of Moldova 2005; Govt. of Moldova 2010 0

In terms of the observed under-five child mortality levels cited in MDG Report 2005 and 2010, and plotted in Figure 12, they were also found to match those calculated using live births 1000g+, and not using 500g+ as described in the report. Please see the issues noted above pertaining to the IMR levels which also pertain to the U5MR.

As with the IMR tracking, this review of U5CM tracking situation in Moldova suggests that it is important to adequately monitor observed levels of U5CM. If specialists at MoH maintain than target-setting is a necessary aspect of monitoring progress, then they may consider alternate methods of projecting targets to the current method of using a linear projection (see discussion on Target-setting below).

MDG 5: Reduce the maternal mortality ratio

TARGET 1 (2005): Reduce the maternal mortality [ratio] from 28 per 100,000 live births in 2002, to 23 in 2006, to 21 in 2010 and to 13.3 in 2015 (Govt. Moldova 2005, p. 41).

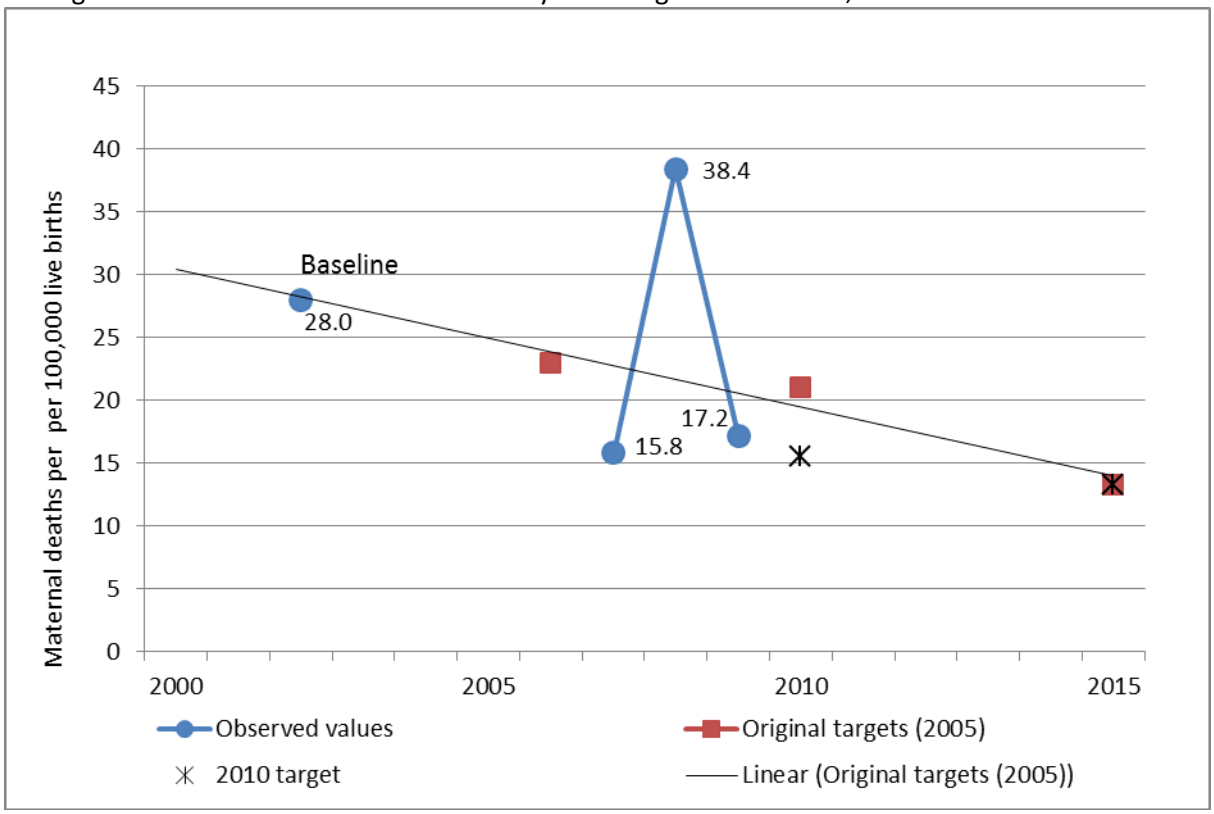
TARGET 1 (2010): Reduce the maternal mortality [ratio] from 28 per 100,000 live births in 2002, to 15.5 in 2010, and 13.3 in 2015 (Govt. Moldova 2010, p. 66).

The original national targets set in 2005 were revised in 2010, presumably due to the same reason that early childhood mortality targets were revised, that is, in anticipation of implementing a new definition of live birth to include live births from 500g. This revision moved the 2010 estimate from 21 maternal deaths to 15.5 maternal deaths per 100,000 live births. This is not a significant difference in statistical terms, however, as they both represent about 0.2 maternal deaths per 1,000 live births.

In general, trend analysis of maternal mortality is difficult to monitor due to many uncertainties: maternal mortality is a rare event and therefore wide uncertainty ranges around the indicator level make it difficult to ascertain statistically significant changes (statistical uncertainty); unlike childhood mortality, maternal mortality relies on an accurate attribution of cause of death, it is therefore prone to misclassification error (qualitative uncertainty); potential disincentives to attribute a death to a maternal cause-- for example, if it occurred during an illegal abortion procedure (socio-political uncertainty). In Moldova, the latter disincentive has apparently been addressed through adopting liberal abortion measures so as to facilitate more complete reporting[30].

The situation of targets and observed maternal mortality ratios in Moldova is presented in Figure 13. The reader is referred back to the discussion on Consistency regarding MMR (p. 16-17 of this report) which cautions against the over-interpretation of changes in MMR levels that may not be significant, and the need for presenting a smoother trend line by using a 3-year moving average.

Figure 13. Evolution of maternal mortality ratio targets in Moldova, 2002-2015



Source: Govt. of Moldova 2005; Govt. of Moldova 2010

[30] This statement is based on communication with experts at MoH. Further research would be needed in this area in order to obtain details on exact laws, services, etc., and to determine the effect of these changes, if any, on completeness of reporting. See for example, law 411 and 813 http://lex.justice.md/index.php?action=view&view=doc&lang=1&id=336941; http://lex.justice.md/.

The NBS metadata in Appendix C3 indicates that the denominator used to calculate MMR is live births 500g+. However, as with infant and under-five child mortality rates, the denominator used appears to be live births 1000g+ (based on the author's calculations using data from NCHM-DPS).

In regards to international partners' tracking of MMRs, 99% of maternal deaths occur in developing countries and hence the focus of the international target is in these countries, countries like Moldova and others with an MMR of less than 100 are considered already "on track" by WHO, UNICEF, UNFPA and World Bank (WHO *et al*. 2010, p.22). In Moldova, where MMR is under 100 and where the coverage of prenatal and postnatal care is already high, further investments in preventive care may gain minimal increases. Therefore, in addition to maintaining high levels of preventive care, policy makers and program specialists will examine evidence and decide where additional investments should be made in order to ensure that maternal mortality becomes a rarer event e.g., in improved infrastructure, emergency obstetric care in remote areas, etc[31].

Setting targets to 2025[32]

Target-setting can be academic, mathematical, or strictly purposeful. An *academic* approach to forecasting is likely the soundest approach because it takes into account many hypothesized factors e.g., socioeconomic (e.g., wealth status of household, education level of mother, residence, access to health care), biological (e.g., age of mother, health status of mother, birth order, birthweight), and ecological (e.g., geographic location, access to improved water and sanitation, pollution) factors that are hypothesized to influence mortality. The disadvantage, however, is in order to translate the mix of these factors and their interactions into numerical targets, a substantial quantity of multilevel data (individual, household and community level) of good quality is needed, ideally for subnational areas over periods of time. Furthermore, forecasting targets based on these factors would require assumptions about future trends that may be difficult to predict accurately. A good example of the relevant factors and methodology to forecast under-five mortality is presented by Pandey *et al.* (2005).[33]

A *mathematical* approach to forecasting is straightforward. It draws on trend information from available data, fits the best line, and extrapolates this line, forward or backward e.g., spline and Loess smoothing[34], exponential, linear, etc. With this approach, the question is whether the resulting, strictly quantitative, targets are meaningful given the actual setting. In Moldova, childhood mortality rates are already low according to international standards. As mortality declines to low levels, in order to achieve further gains ever, greater investments are needed for relatively smaller declines. Costly investments are needed such as training and technology to save complicated cases in the most rural areas, and improved infrastructure to ensure equal and timely access to high quality services. For example, certain population groups such as the Roma are less

[31] For example, the 2005 MDHS showed that while virtually all pregnant women access prenatal care, 40% of these women access prenatal care on foot, and 30% by public transport (NCPM and Macro 2006, pp.110-128).
[32] Year as agreed with the MoH.
[33] Pandey A, Bhattacharya B, Sahu D, Sultana R. 2005. Components of under-five mortality trends, current stagnation and future forecasting levels. In NCMH Background Papers, Burden of Disease in India. National Commission on Macroeconomics and Health, Ministry of Health & Family Welfare, Government of India, New Delhi. PP 152-178.
http://www.who.int/macrohealth/action/NCMH_Burden%20of%20disease_(29%20Sep%202005).pdf
(accessed 11 July 2011)
[34] Silverwood R. and Cousens S. 2008. Comparison of spline- and loess-based approaches for the estimation of child mortality. London School of Hygiene and Tropical Medicine.

likely to access high quality health services and thus may require specialized interventions to assure that health indicators among this group are at least as good as for the general population (UNDP 2007 pp. 13-14).

A *purposive* approach to setting targets, using evidence as a basis for multidisciplinary and multi-sectoral contributions, may yield the most efficient and equally valid targets. One such method would be to use the mortality level in the best-performing rayon, or region, as the benchmark to which all others may be expected to converge. An adaptation of this approach would take into account the expected social-economic situation of the worst-performers.

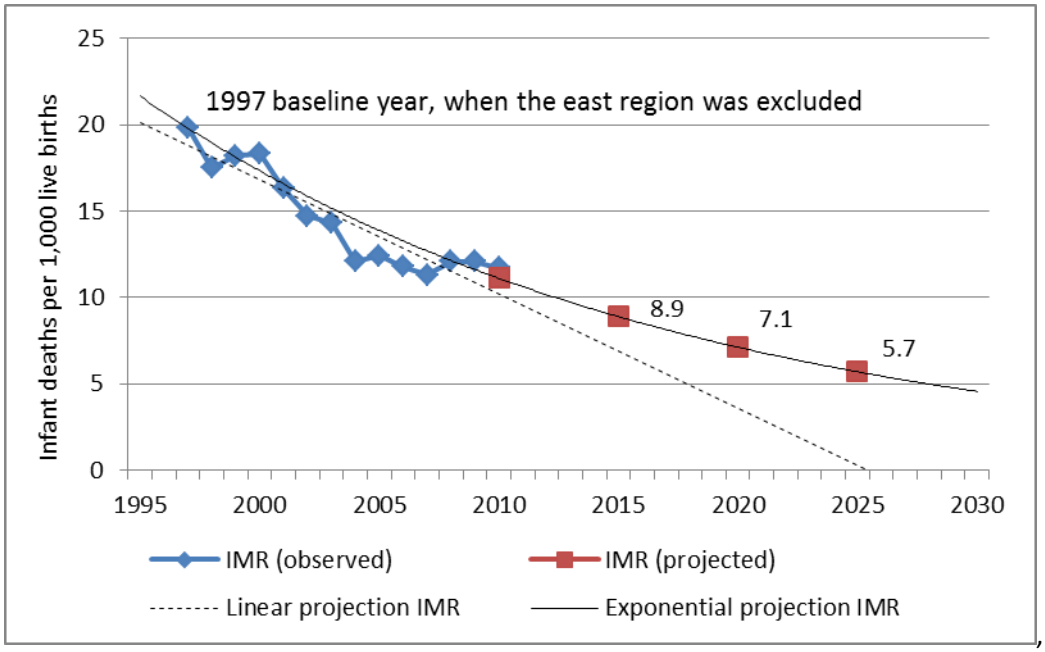
It was requested during this mission to propose a mathematical approach to setting targets to 2025. The national MDG targets for 2015 were found to be based on a linear formula[35] (see Figures 11 and 12). Note that the linear trend results in IMR and U5MR levels of zero by 2025 which is not a likely outcome. Given that reductions in childhood mortality become increasingly difficult to achieve as levels drop, the approach proposed below uses an exponential method. The exponential distribution is commonly used to predict rare events, such as death, which happen successively over defined periods of time[36]. The fitting of the exponential curve in this exercise is used to project early childhood deaths over one-year periods.

Figures 14 and 15 show an exponential distribution fitted to 14 years of observed data, from 1997--the year when annual estimates no longer included data from Bender and the east bank of the Nistru River-- until 2010. The linear projection trend is also shown in the figures as a comparison to the exponential projection. It should be noted that the targets for IMR and U5MR in 2015, 2020 and 2025 are mainly for discussion purposes, as requested by the MoH specialists, in order to provide a logical basis from which experts and/or concerned institutions could evaluate and revise according to their qualitative insights of future mortality levels. One consideration would be to examine evidence regarding the availability of 'quality' health services (indicators of quality could include the staffing of health personnel, the recency of refresher training, and the availability of medicines and equipment) as well as the equal accessibility of these services to target populations across the country. Questions and answers about how to bring about further improvements in health to lower mortality levels are no doubt discussed among the national experts, and should necessarily be extended to inter-sectoral forums including with those in the education, transportation and financing ministries.

Figure 14. Projected targets for infant mortality rates, 2015, 2020, and 2025

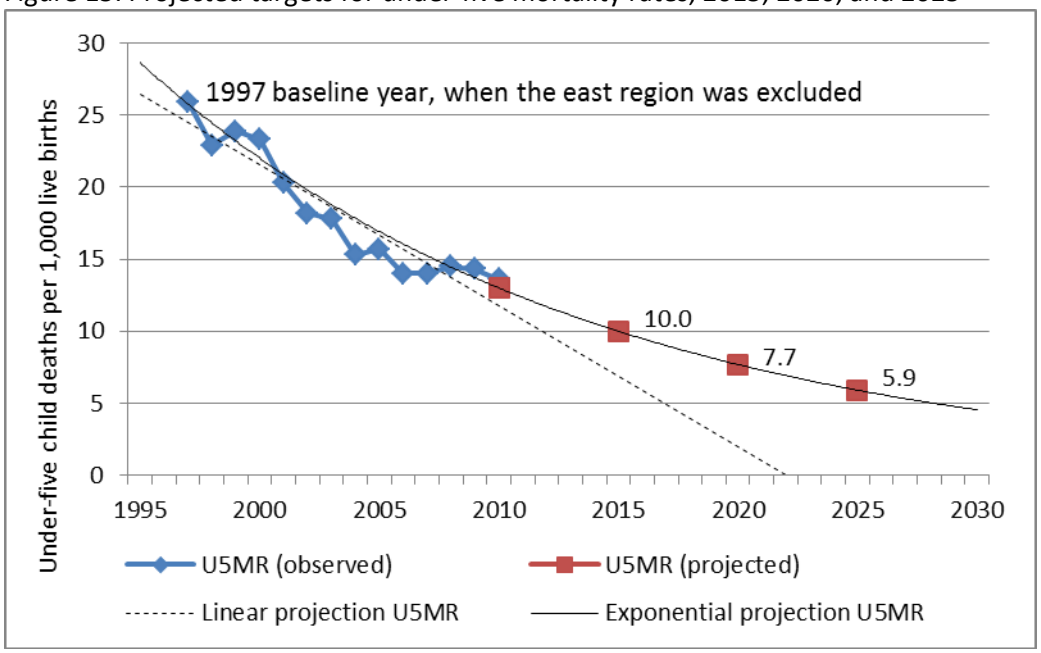
[35] Using the standard linear regression formula: *$y=a_0+b_1x$, where y is the predicted IMR value, a_0 is the initial estimate, b_1 is the constant slope, and x is number of years from baseline year i.e., current year - year of initial estimate.*

[36] The exponential formula is*: $y=a(b^x)$, where y is the predicted IMR value, a is the initial estimate, and x is exponentiated number of years from the baseline year i.e., current year - year of initial estimate multiplied by the average percent decline between observations.*



Source: Observed IMR levels from NBS website; projected values using exponential formula

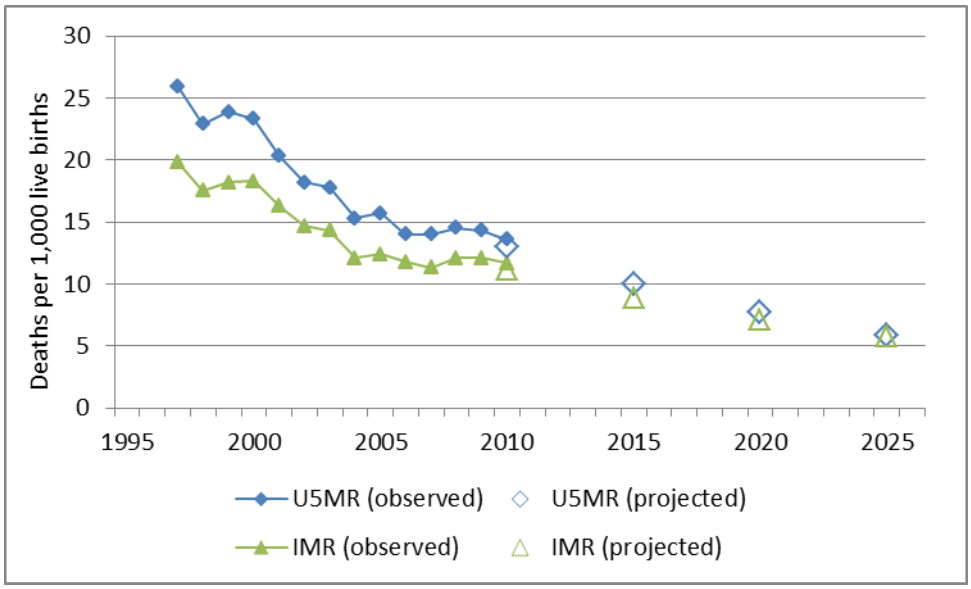
Figure 15. Projected targets for under-five mortality rates, 2015, 2020, and 2025



Source: Observed U5MR levels from NBS website; projected values using exponential formula

Figure 16 plots the same observed and projected values for both IMR and U5MR to show side-by-side the declines in each. Notice that the IMR levels decline at a steeper rate than the U5MR; this is because the past decline of the IMR, since 1997, was also steeper. Although this is purely a mathematical artifact, a trend toward convergence can also be expected in a real scenario. This is because, as seen in the data quality section on Accuracy, the largest proportions of early childhood deaths occur at the earlier ages (early neonatal deaths), and as conditions improve an increasingly smaller share of children who die will die at later ages. In short, among all deaths to children under five, an increasingly larger proportion of them will die at early ages due to unavoidable causes such as congenital diseases; a larger share of live births will be more likely to survive competing risks, such as prematurity and infectious diseases, due to improved conditions and better emergency health care.

Figure 16. Projected targets for IMR and U5MR, 2015, 2020, and 2025



Source: Observed IMR and U5MR levels from NBS website; projected values using exponential formula

In summary, it is reiterated that the mathematical models using the exponential formulas are a plausible approach to future trends in early childhood mortality; however, given low levels of mortality already, experts knowledgeable about the social and economic situation across Moldova need to be consulted to determine if the pace of further declines is realistic. Moreover, as noted above, when the mortality rates are already low and real differences between values become more difficult to detect, then priority should be on monitoring trends accurately over time, using verified data and adhering to definitions and formulas in the metadata, and establishing criteria to determine if changes in levels are significant or not. In addition to monitoring national trends, sub-national trends should also be monitored to ensure comparable declines are being made across areas and sub-populations.

ANALYSIS AND PRESENTATION OF PROGRESS ON MDGS4 & 5

This section makes suggestions that may be pertinent for preparing the 2013 Interim MDG report, and the 2015 report:

Methodology

- Include a methodological preamble to describe the main official data source, or sources, or alternative sources i.e., where do they come from (e.g., population-based surveys, routinely reported data from facilities), who collects it (e.g., NCHM, NBS), how obtained (e.g., on-line, special request)
- Metadata on MDG 4 & 5 indicators exists, make reference to these in order to not have to reiterate technical details that may be of interest to some readers but not all. If metadata are not used then mention in the text the methodological details (calculation formula, etc.) per se.

Definitions

- Technical terms—including specialized vocabulary in the field of health and demographics -- are necessary to clearly distinguish what does and does not constitute an event (e.g., live

birth, infant death, a rate or ratio) and should be defined prior to the use of the concept, using full definitions and/or a clear citation to each. Indicate if it is a standard, international definition, or if/how it differs from a standard definition.

Targets

- Simplify the wording and content as much as possible, stating exactly what is being measured e.g., maternal mortality *ratio* (not rate, as sometime indicated in the report).
- Citing baseline and final target values should be sufficient, do not include decimal points in target definition. (Too many numbers in a text are difficult for the reader to grasp—save them for tables and figures.)
- Avoid moving targets. If targets justify revision then the reason and exact revision need to be clearly documented. In the case of the revised MDG 4 & 5 targets, an illustration such as presented in this report may be helpful to the reader.

Figures and tables

When monitoring trends, tables and figures can convey a lot of information in a small space, and this type of graphical information presentation is also more user-friendly and easy-to-understand. Many readers glean information from such reports more from looking at these instead of reading the text.

- Every figure and table should have potential to be used as a stand-alone piece of information, for example, for advocacy pieces or Power Point presentations. This means each one needs a full title, source, and any explanatory notes.
- Data values can be shown on the figure if it is not too cluttered, and if the values are not presented in an accompanying table, appendix, or elsewhere; do not use decimal points unless they are significant information.
- For 'continuous' data, such as annual estimates, line graphs are best to show implied continuity; for discrete categories, such as sex or residence, bar or pie charts are best;
- All tables and figures should be referred to in the text, usually just above or below, if space permits. Verify that information in the text matches the figures.
- Assume figures may be reproduced in black and white, so use patterns and shading instead of colors where possible.
- Sources of data in figures and tables should be from the 'official source', if indeed an official source has been designated by the government. For example, if there is one official source for childhood or mortality rates, then this is the source that should be cited and referenced in the report. If there is not one official source of data then it suffices to provide a citation and full reference.

Content

- Start with reviewing national level trends then, insofar as space permits, highlight subnational patterns and differentials by subgroups including by sex, age, residence (i.e., urban or rural, or by municipalities and rayons), cause of death, and any other differentials deemed particularly important for policy making);
- In addition to discussing rates, it is sometimes important to inform the reader of absolute numbers, especially when they are small e.g., the annual number of maternal deaths may be more meaningful than a ratio or percentage;
- Distinguish between important and not important differences. For example, 99.5% is no different from 99.8%, rather, they are 'about the same' -- and both are 'virtually 100%'; the

author may have to use his/her subjective judgment in some cases if there are not criteria for concluding significant difference (i.e., 95% confidence intervals) ;

- Do not (hardly ever) use decimals in the text, round them to nearest integer;
- Use qualitative information, namely qualitative indicators which come in additions to standard MDG indicators and explain them from the qualitative side. Other qualitative indicators may be deemed important to monitor by health and development specialists in-country;
- Official, verified information should be the priority source of information, complemented by other sources that are clearly referenced. Any data quality issues from these sources should be acknowledged. Comparisons of indicators from different sources e.g., childhood mortality levels from vital registration compared to those from population-based surveys, are useful to compare plausible levels, and may help to define uncertainty levels or distinguish between a real change, versus a random fluctuation within an expected range.

Citations and references

- Use a standard citation and referencing method, such as the Harvard style used in this report, so that the reader can easily track the source, including author, title, page number and website

Translation and proofreading

- Often translators are not experts in the field of health statistics, and therefore it is necessary that a technical expert proofreads and corrects terminology. The English translation of the 2010 MDG report, for example, would have benefitted from a more rigorous review.
- Check that the content is the same between versions of the report in Romanian and English language, including the text, figures, tables and citations.

MDG report ownership
The country is always assumed to be the one credited and accountable for quality of the work.

Conclusions and recommendations

This section follows the outline of the report and summarizes conclusions and recommendations from each section. A page number for each recommendation is provided for easy referral in the body of the report.

© - conclusions

® - recommendations

(The country should decide internally on assigning the responsible institution to implement the below recommendations if acceptable.)

Data sources and flows

© Coverage and completeness of vital registration is high, and percentage of ill-defined causes is low. All together, these attributes reflect very good data collection and reporting trends from vital registration data.

® Review and revise contents of birth, death and perinatal reporting forms to **ensure that UNESA-recommended information is available** (pp.3-6)

® Monitor the coverage of **birth registration among the youngest children**, 0-6 months (p.5)
® Improve the **completeness in reporting perinatal statistics** (in particular, birth weights of fetal deaths) and **abortions** (p.7)

Data quality

© *Reliability*. The reliability of the annual numbers of births, early childhood and maternal deaths, and live births 1000g+ is very good, indicating harmonized data collection and reconciliation at the central level.

® **Investigate discrepancies regarding the number of live births** by weight category (500g+ and 1000g+), and deaths to infants in these categories and, if deemed important to disseminate, then should be corrected or explained with adequately detailed metadata and reflected/used in the future reporting (p.9)

© *Completeness*. There is a high level of adherence to the international definitions and reporting criteria for childhood and maternal mortality, however, it is not always clear how this is put into practice. More explicit metadata, in terms of definitions and calculations, need to be readily available to users.

® There is a significant difference in IMR and U5MR levels depending on which weight category is used. **Clarify metadata for IMR and U5MR**, in particular whether the calculation is based on deaths to live births for 500g+, or those to 1000g+ (pp.11-12)

® Make available the full definition and **metadata pertaining to maternal mortality,** on the institution's website that officially disseminates maternal mortality data i.e., NCHM (p.12)

® WHO recommends **that late maternal deaths and pregnancy-related deaths** be captured on the death registration form, national experts should consider including this revision (pp.12-13)

® WHO recommends that maternal deaths be subdivided into two groups, direct obstetric deaths and indirect obstetric deaths; CMNS-DPS **metadata should be available on-line and include definitions of the main subdivisions**, which include the two groups recommended by WHO (p.13)

® In order to ensure accurate classification of deaths of women of reproductive age, and to prevent possible misclassification of deaths to a non-maternal cause, the MoH expert **Commission may consider following up on all deaths of women of reproductive age**, or a sample of these deaths (p.13)

© *Consistency*. Data available to users on childhood and maternal mortality from the NCHM-DPS or NBS permit options for disaggregation by geographic areas and by year, which increases the potential for trend analysis and sub-national analysis.

® When monitoring trends or sub-national differences, or differences between groups (e.g.,, age, residence), the MoH should **adopt criteria to judge whether fluctuations are considered 'real' progress** (or decline) or are within a range of random fluctuation. This will be useful when evaluating whether trends are significant or not in MDGs (pp.14-16)

® A **3-year moving average** would be more useful to assess progress **in maternal mortality** (p.16); on the other hand, the numbers of maternal deaths are so low that national experts may select a few **key qualitative indicators** to provide more useful evidence for tracking improvement in maternal health—see for example (pp.16-17)

© *Accuracy*. A data quality assessment comparing the timing of early childhood deaths [37]showed no evidence of significant omissions of early deaths among live born infants.

® However, evidence suggests that **stillbirths (i.e., fetal deaths, born-dead) are underreported** and this should be investigated sub nationally, among reporting entities completing the perinatal form (p.19)

Targets and tracking MDG

© Monitoring MDG progress i.e., real (significant) changes in mortality levels, is in reality difficult to evaluate when mortality levels are already low, such as in Moldova. While solid efforts have been made to track national progress in MDGs through setting MDG 4 & 5 targets, the method used for target-setting and revisions was difficult to ascertain. Furthermore, in tracking observed levels of IMR and U5CM, the calculation of the indicators do not adhere to definitions and the calculation methodology indicated in the metadata. There appears to be no criteria to evaluate whether annual changes in mortality levels constitute real progress (versus an acceptable range of random fluctuation) between years and across regions.

® As noted in the tracking of targets, the actual calculation of observed IMR and U5MR rates is not consistent with the description of the 'new definition for live birth'; **metadata should reflect the actual methodology being employed to generate indicator values, and vice versa** (pp. 21-22).
® To adequately track levels of IMR and U5CM, **the quality of data used to generate indicators should be verified and these data available to users** from the NCHM-DPS (pp. 24)
® When the mortality rates are already low and real differences between values become more difficult to detect, then annual changes need to be assessed in light of reasonable ranges of uncertainty; attention should be placed on establishing **criteria for evaluating 'real' progress** versus random fluctuations (p. 24).
® In addition to monitoring national trends, **monitoring equity** is important to identify sub-national differences in levels that may require interventions to ensure access to the same health care standards are available everywhere, to all (p. 29).
® Specialists at MoH may consider alternate methods of setting targets to the current method of using a linear projection, such as the alternative presented in this report. If mathematical projections are used, then experts knowledgeable about the social and economic situation across Moldova need to be consulted to determine if the pace of further declines is realistic. Whichever method is selected it should be **well-documented and available** to readers (pp. 27-30).

Analysis and presentation

See specific suggestions in above section.

[37] No data quality assessment on accuracy of maternal deaths was done—this type of assessment would involve checking physician certification of deaths, for example. Number of maternal deaths just too small to do the same type of statistical assessment.

Other

- ® Organize ICD-10 training for physician death certification and coders.
- ® Strengthen analytical capacity in-house (in MoH), and in research institutes, to fully exploit evidence available from health statistics-- from NCHM and elsewhere.
- ® Use UNDAF and the next 5-year National Development Strategy to propose new indicators to be monitored in HIS.
- ® A national reproductive health strategy has been developed which includes strategies to address high rates of abortion. The MoH collects detailed data on abortion, these data need to be verified for completeness and used to monitor abortion rates (pp. 7-8).

Key persons met

Ministry of Health

Rodica Scutelnic	Head of division on policies of medical assistance provided to women, children, and vulnerable groups
Galina Morari	Vice-head of division on policies of medical assistance provided to women, children, and vulnerable groups
Galina Buta	Head of policy monitoring divisions
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Nina Cesnocova	Head of demographic statistics unit

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Petru Stratulat	First-vicedirector, Institutul de Cercetari Stiintifice in domeniul Ocrotirii Sanatatii Mamei si Copilului (ICSOSMC)

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UNDP

Aurelia Spataru	Project Manager

WHO Country Office

Larisa Boderscova	National Program Officer, Health Systems & Family and Child Health

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See reference

NCHM – *see* National Center for Health Management
NCPM – *see* National Scientific and Applied Center of Preventive Medicine
UNDP – *see* United National Development Program
UNESA – *see* United Nations Economic and Social Affairs
WHO – *see* World Health Organization
WHOSIS - *see* World Health Organization Statistical Information System
MoH - *see* Ministerul Sanatatatii al Republicii Moldova/Ministry of Health

Appendix A. Final Agenda

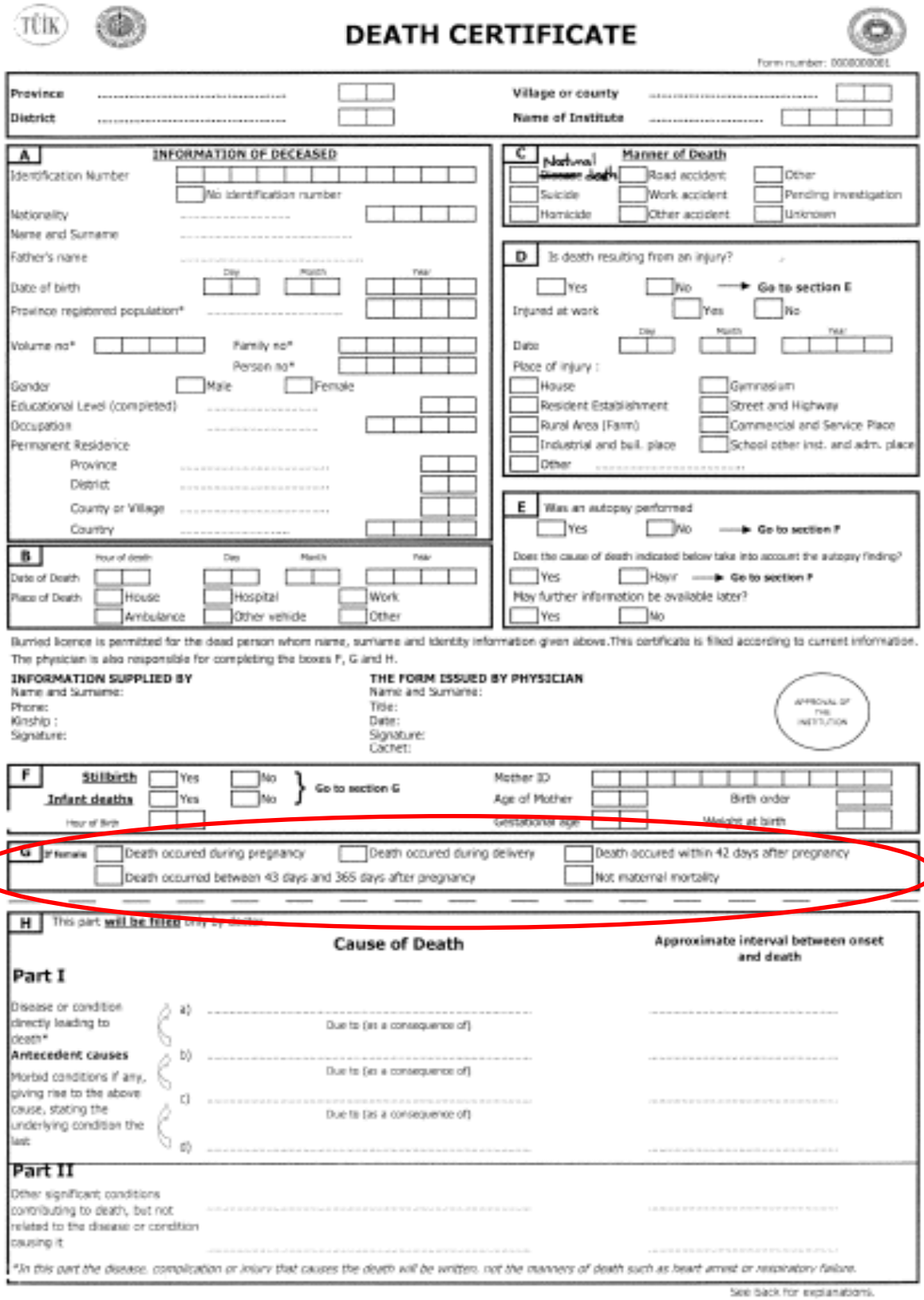
Advisory mission of WHO international expert to review and help to improve the statistical indicators on MDGs 4 & 5 (child and maternal mortality)
Chisinau, Moldova
20th - 23rd June 2011

Statistics Project
106 Grenoble St., office 802, Chisinau, Moldova
Phone: (+373 22) 403142, 210868
Aurelia Spataru: +373 690 99319 (Mob)

Time	Meeting	Contacts
Friday, 17 June 2011		
12.15	Arrival	
Monday, 20 June 2011		
09.00 – 09.30	Discussion with **Statistics Project** – objectives, tasks of mission	Statistics Project, 106 Grenoble Str., 8th floor, office 802 403142, +373 690 99319
09.30-10.45	Discussions with NBS staff on– main producer of official data on demography (vital statistics) in the country **Nina Cesnocova**, head of demographic statistics unit *Task: Act. 1, 11 (indicators on demographic development)*	106 Grenoble Str., 6th floor, office 601 403110
11.00-12.00	Meeting with the National Center for Health Management – main producer of official data on health in the country **Petru Crudu**, Vice-head of health statistics and monitoring Division *Task: Activ.1, 2 (other sources), 4 (future monitoring), 5 (disaggregation), 6 (design perinatal indicators), 7 (causes of maternal death), 8 (no abortions), 9 (feasibility on new indicators)*	3 Cozmescu St. 727386 280473 728066
12.00 - 13.30	Lunch	
13.30-14.30	Meeting with Ministry of Health – elaborates and monitors health policies **Galina Buta**, head of Policy Monitoring Divisions *Task: Activ.1, 2 (other sources), 3 (forecast), 4 (future monitoring), 5 (disaggregation), 7 (causes of maternal death), 9 (feasibility on new indicators)*	str. Vasile Alecsandri, 2 268813, 693 22284
14.30-16.00	Meeting with Ministry of Health **Rodica Scutelnic**, head of Division on Policies of medical assistance provided to women, children and vulnerable groups **Galina MORARI**, vice-head of Division on Policies of medical assistance provided to women, children and vulnerable groups *Task: Activ.1, 2 (other sources), 3 (forecast), 4 (future monitoring), 5 (disaggregation), 6 (design perinatal indicators), 7 (causes of maternal death), 9 (feasibility on new indicators)*	 268871, 691 48446 268876
Tuesday, 21 June 2011		
11.00-12.00	Meeting with UNICEF **Angela Capcelea**, Youth and Adolescence Development specialist **Elena Laur**, Monitoring and Evaluation Officer	UN House, 131 31 August Str. 269152
11.30 - 12.30	Lunch	
14.00-15.00	Meeting with academia. **Petru Stratulat**, prim-vicedirector al IMSP Institutul de Cercetari Stiintifice in domeniul Ocrotirii Sanatatii Mamei si Copilului (ICSOSMC), **mortalitatea infantila** *Task: Activ.1, 4 (future monitoring), 6 (design perinatal indicators), (causes of maternal death), 9 (feasibility on new indicators)*	794 78133, 523641, str. Burebista, 93, 52-36-61 anticamera, http://www.mama-copilul.md/ 69123185
16.00-17.00	Meeting with WHO/Moldova **Larisa Boderscova**, PhD, NPO, Health Systems, FCH	27 Sfatul Tarii str., office 37-38 237498
Wednesday, 22 June 2011		
10.00 – 13.00	Debrief meeting with A.Spataru	Statistics Project Office

Time	Meeting	Contacts
13.00-13.30	Debrief for the NBS - Nina Cesnocova (Demographic statistics unit)	NBS, 106 Grenoble Str.,
14.00-	Preparation of the presentation of preliminary findings	
Thursday, 23 June 2011		
09.00-10.00	Debriefing on the mission preliminary findings and recommendations Ministry of Health, Galina Buta, Rodica Scutelnic, Petru Crudu	str. Vasile Alecsandri, 2
12.55	Departure to Geneva	

Appendix B1. Turkey death certificate with recommended revision for late maternal death and pregnancy-related death



DEATH CERTIFICATE

Form number: 00000001

Province ..... Village or county .....
District ..... Name of Institute .....

A INFORMATION OF DECEASED

Identification Number
No identification number
Nationality .....
Name and Surname .....
Father's name .....
Date of birth (Day / Month / Year)
Province registered population* .....
Volume no* Family no*
Person no*
Gender Male Female
Educational Level (completed) .....
Occupation .....
Permanent Residence
Province .....
District .....
County or Village .....
Country .....

B

Date of Death (Hour of death / Day / Month / Year)
Place of Death House Hospital Work
Ambulance Other vehicle Other

C Manner of Death

Natural Disease death
Suicide Homicide
Road accident Work accident Other accident
Other Pending investigation Unknown

D Is death resulting from an injury?

Yes No → Go to section E
Injured at work Yes No
Date (Day / Month / Year)
Place of injury :
House Resident Establishment Rural Area (Farm) Industrial and buil. place Other
Gymnasium Street and Highway Commercial and Service Place School other inst. and adm. place

E Was an autopsy performed

Yes No → Go to section F
Does the cause of death indicated below take into account the autopsy finding?
Yes Hayır → Go to section F
May further information be available later?
Yes No

Burried licence is permitted for the dead person whom name, surname and identity information given above.This certificate is filed according to current information.
The physician is also responsible for completing the boxes F, G and H.

INFORMATION SUPPLIED BY
Name and Surname:
Phone:
Kinship :
Signature:

THE FORM ISSUED BY PHYSICIAN
Name and Surname:
Title:
Date:
Signature:
Cachet:

APPROVAL OF THE INSTITUTION

F

Stillbirth Yes No
Infant deaths Yes No
} Go to section G
Hour of Birth
Mother ID
Age of Mother Birth order
Gestational age Weight at birth

G If female

Death occured during pregnancy
Death occured during delivery
Death occured within 42 days after pregnancy
Death occurred between 43 days and 365 days after pregnancy
Not maternal mortality

H This part will be filled only by doctor

Cause of Death

Approximate interval between onset and death

Part I

Disease or condition directly leading to death*
a) ..... Due to (as a consequence of)
Antecedent causes
Morbid conditions if any, giving rise to the above cause, stating the underlying condition the last
b) ..... Due to (as a consequence of)
c) ..... Due to (as a consequence of)
d) .....

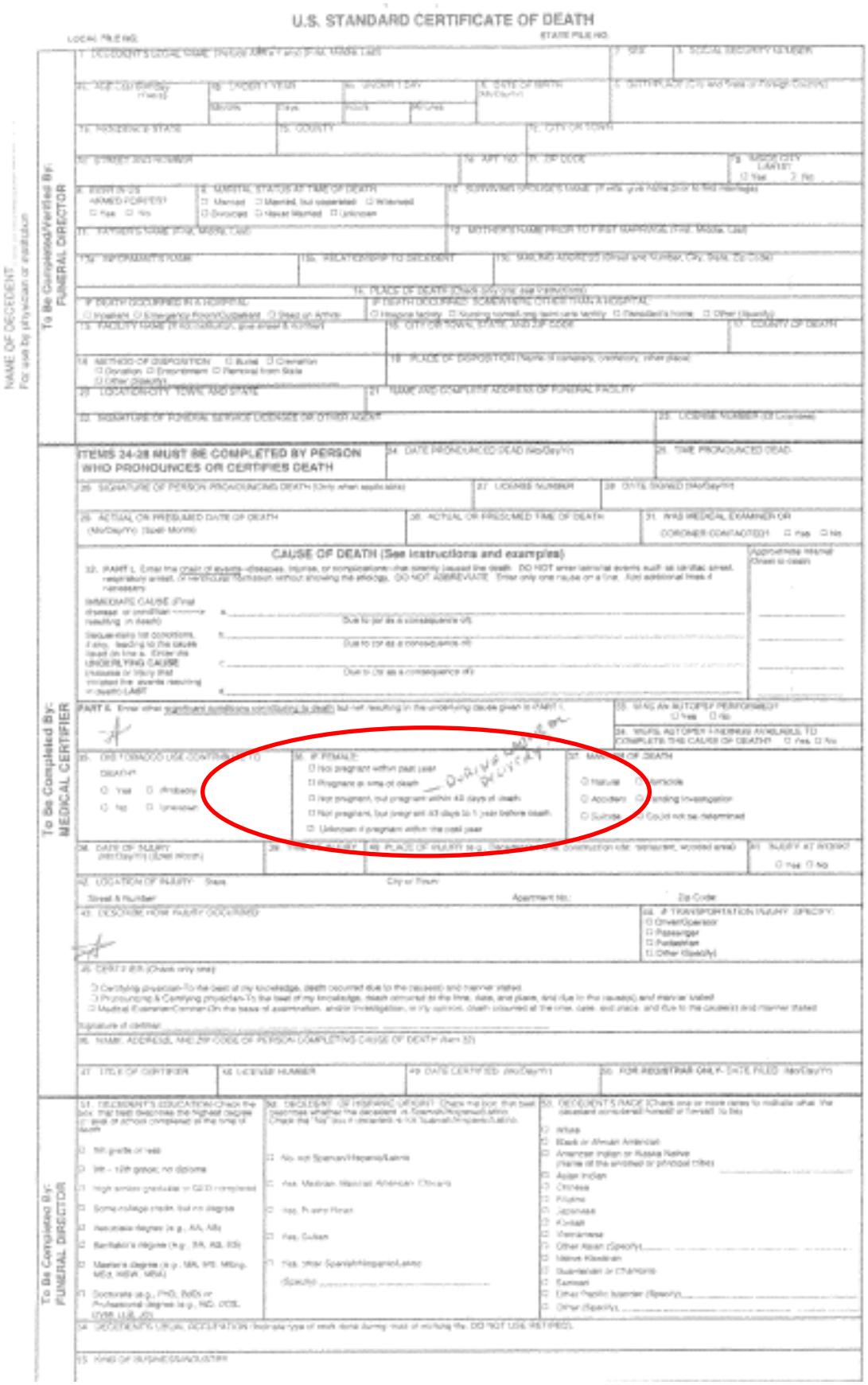
Part II

Other significant conditions contributing to death, but not related to the disease or condition causing it .....

*In this part the disease, complication or injury that causes the death will be written, not the manners of death such as heart arrest or respiratory failure.

See back for explanations.

Appendix B2. United States death certificate with recommended revision for late maternal death and pregnancy-related death


U.S. STANDARD CERTIFICATE OF DEATH

LOCAL FILE NO.

STATE FILE NO.

NAME OF DECEDENT
For use by physician or institution

To Be Completed/Verified By: FUNERAL DIRECTOR

ITEMS 24-28 MUST BE COMPLETED BY PERSON WHO PRONOUNCES OR CERTIFIES DEATH

CAUSE OF DEATH (See instructions and examples)

To Be Completed By: MEDICAL CERTIFIER

To Be Completed By: FUNERAL DIRECTOR

Appendix C1. Metadata for Infant mortality rates, National Bureau of Statistics

Rata de mortalitate infantilă Metadate privind indicatorii ODM Biroul Național de Statistică (BNS)

Definiție	Indicator demografic care indică numărul copiilor decedați în vîrsta sub un an ce revin în medie la 1000 de născuți-vii în anul de referință
ODM național	ODM 4. Reducerea mortalității copiilor.
Unitatea de măsură	Promile (‰)
Formula de calcul	***Rata de mortalitate infantile*** *unde: D_0 - decedați în vîrsta sub 1 an, din numărul celor născuți în anul pentru care se calculează rata* *D_1 - decedați în vîrsta sub 1 an din numărul născuților în anul precedent* *N_0 - născuți-vii în anul pentru care se calculează rata* *N_1 - născuți-vii în anul precedent* Notă: Datele se bazează pe înregistrarea copiilor nou-născuți cu masa de la 500 gr şi de la 22 săptămîni gestație
Nivelul de dezagregare	Pe sexe; Pe medii; Pe medii ; Pe raioane.
Periodicitatea diseminării	Trimestrial Anual
Termenele limită de prezentare (diseminare)	În termen de 60 de zile după perioada de referință: - trimestrial: mai, august, noiembrie - anual: februarie după anul de referință şi 10 aprilie după anul de referință
Revizuirea	Datele diseminate în aprilie sunt finale
Sursa de date	Elaborarea datelor este bazată în temei pe sursele administrative de date deținute de Ministerului Justiției (Serviciul Stare Civilă), Ministerului Sănătății (Centrul Național de Management in Sănătate), Ministerului Tehnologiilor Informaționale şi Comunicațiilor (Întreprinderea de Stat „Centrul Resurselor Informaționale de Stat „REGISTRU").
Comparabilitatea la nivel internațional	Datele statistice sunt elaborate în corespundere cu recomandările internaționale în vigoare, în special cu „Principii şi recomandări pentru statistica stării civile - ONU " (ST/ESA/STAT/SER.M/19/Rev.2 New York, 2003). Începînd cu 1 ianuarie 2008, urmare implementării standardelor europene a fost efectuată trecerea la înregistrarea în statistica oficială de stat a naşterii şi copiilor nou-născuți cu masa de la 500 gr şi de la 22 săptămîni gestație (pînă la 01.01.2008 erau înregistrați copii cu greutatea de 1000 gr şi peste şi după a 30-a săptămîna încheiată de gestație).
Comparabilitatea în timp	Disponibilitatea datelor: • Național (mediul urban, mediul rural):1940, 1946, 1950-2008 • Național (pe sexe si medii):1980-2009 • Raioane:1989-2009 (în hotarele raioanelor di anii respectivi), excepție anii 1999-2002 - județe • Municipii, oraşe:1989-2009 Indicatorii la nivel național sunt comparabili pînă la anul 2008 (au fost calculați conform metodologiei vechi). Începînd cu 2008 indicatorii sînt calculați conform metodologiei noi (ved. mai sus). Indicatorii în profil teritorial (în special pe raioane) nu sunt comparabili întru totul în timp din cauza schimbărilor hotarelor unităților administrativ - teritoriale. În a.1999-2002 datele statistice pe raioane nu sunt disponibile, fiind prezentate doar pe județe - unitățile administrativ-teritoriale de nivelul 2 existente în perioada nominalizată.
Coerența cu alte statistici (indicatori	Rata mortalității copiilor pînă la 5 ani; Rata de mortalitate pe cauze de deces.

Rata de mortalitate infantilă Metadate privind indicatorii ODM Biroul Național de Statistică (BNS)

corelați)	
Informație de contact	Direcția statisticii pieței muncii și demografiei Nina Cesnocova, șef adjunct al direcției tel. 40 31 10 e-mail: nina.cesnocova@statistica.md
Ultima actualizare a metadatelor	01.12.2010
Nota	Metadate mai detaliate sunt disponibile la adresa: http://www.statistica.md/public/files/Metadate/Populatia.pdf Serii de date cu informa□ie privind Ținta ODM sunt disponibile la adresa: http://www.statistica.md/pageview.php?l=ro&idc=421&id=3199

26 july 2011

Appendix C2. Metadata for Under-five mortality rates, National Bureau of Statistics

Rata mortalității copiilor pînă la 5 ani Metadate privind indicatorii ODM Biroul Național de Statistică (BNS)

Definiție	Indicator demografic care indică numărul copiilor decedați în vîrstă depînă la 5 ani ce revin în medie la 1000 de născuți-vii în anul de referință.
ODM național	*ODM 4.* Reducerea mortalității copiilor.
Unitatea de măsură	Promile (‰)
Formula de calcul	***Rata mortalității copiilor pînă la 5 ani*** $RMC = \frac{N}{D} \times 1000$ *unde: D - decedați în vîrsta 0-4 ani în anul pentru care se calculează rata* *N - născuți-vii în anul pentru care se calculează rata* Notă: Datele se bazează pe înregistrarea copiilor nou-născuți cu masa de la 500 gr şi de la 22 săptămîni gestație
Nivelul de dezagregare	Pe sexe, pe medii
Periodicitatea diseminării	Anual
Termenele limită de prezentare (diseminare)	10 aprilie după anul de referință
Revizuirea	Datele diseminate în aprilie sunt finale
Sursa de date	Elaborarea datelor este bazată în temei pe sursele administrative de date deținute de Ministerului Justiției (Serviciul Stare Civilă), Ministerului Sănătății (Centrul Național de Management in Sănătate), Ministerului Tehnologiilor Informaționale şi Comunicațiilor (Întreprinderea de Stat „Centrul Resurselor Informaționale de Stat „REGISTRU".
Comparabilitatea la nivel internațional	Datele statistice sunt elaborate în corespundere cu recomandările internaționale în vigoare, în special cu „Principii şi recomandări pentru statistica stării civile - ONU " (ST/ESA/STAT/SER.M/19/Rev.2 New York, 2003). Începînd cu 1 ianuarie 2008, urmare implementării standardelor europene a fost efectuată trecerea la înregistrarea în statistica oficială de stat a naşterii şi copiilor nou-născuți cu masa de la 500 gr şi de la 22 săptămîni gestație, (pînă la 01.01.2008 erau înregistrați copii cu greutatea de 1000 gr şi peste şi după a 30-a săptămîna încheiată de gestație).
Comparabilitatea în timp	Seriile de timp sunt disponibile începînd cu anul 1980. Indicatorii sînt comparabili pînă la anul 2008 (au fost calculați conform metodologiei vechi). Începînd cu 2008 indicatorii sînt calculați conform metodologiei noi (ved. mai sus).
Coerența cu alte statistici (indicatori corelați)	Rata de mortalitate pe cauze de deces Rata mortalității infantile
Informație de contact	Direcția statisticii pieței muncii şi demografiei Nina Cesnocova, şef adjunct al direcției tel. 40 31 10 e-mail: nina.cesnocova@statistica.md
Ultima actualizare a metadatelor	01.12.2010
Nota	Metadate mai detaliate sunt disponibile la adresa*:* http://www.statistica.md/public/files/Metadate/Populatia.pdf ***Serii de date cu informa□ie privind Ținta ODM sunt disponibile la adresa:*** http://www.statistica.md/pageview.php?l=ro&idc=421&id=3199

Rata mortalității copiilor pînă la 5 ani

Metadate privind indicatorii ODM
Biroul Național de Statistică (BNS)

26 july 2011

Appendix C3. Metadata for Maternal mortality, National Bureau of Statistics

Rata mortalității materne Metadate privind indicatorii ODM Biroul Național de Statistică (BNS)

Definiție	Indicator demografic care reprezintă numărul femeilor care au decedat în urma complicațiilor din timpul sarcinii sau naşterii în anul de referință, care revin la 100000 de născuți din acel an
ODM național	**ODM 5.** Îmbunătățirea ocrotirii sănătății materne
Unitatea de măsură	Este exprimat per 100 000 născuți-vii
Formula de calcul	***Rata mortalității materne*** *RMM = D / N x 100 000* *unde: D – femei decedați în urma complicațiilor din timpul sarcinii sau naşterii în anul pentru care se calculează rata* *N – născuți-vii* în anul pentru care se calculează rata* * Datele se bazează pe înregistrarea copiilor nou-născuți cu masa de la 500 gr şi de la 22 săptămîni gestație
Nivelul de dezagregare	Pe medii şi raioane
Periodicitatea diseminării	Anual
Termenele limită de prezentare (diseminare)	1 martie după anul de referință
Revizuirea	Datele sunt finale la prima diseminare
Sursa de date	Baza de date a Ministerului Sănătății privind statistica medicală demografică.
Comparabilitatea la nivel internațional	Elaborarea datelor în conformitate cu recomandările OMS privind utilizarea Clasificării Internaționale a Maladiilor, revizia a 10-a OMS
Comparabilitatea în timp	Seriile de timp la nivel național sînt disponibile începînd cu anul 1980, în aspect teritorial - începînd cu anul 1999. Indicatorii în profil teritorial (în special pe raioane) nu sunt comparabili întru totul în timp din cauza schimbărilor hotarelor unităților administrativ - teritoriale. În anii1999-2002 datele statistice pe raioane nu sunt disponibile, fiind prezentate doar pe județe - unitățile administrativ-teritoriale de nivelul 2 existente în perioada nominalizată.
Coerența cu alte statistici (indicatori corelați)	Rata de mortalitate pe cauze de deces Numărul femeilor decedați, pe vîrstă
Informație de contact	Direcția statisticii pieței muncii şi demografiei Nina Cesnocova, şef adjunct al direcției tel. 40 31 10 e-mail: nina.cesnocova@statistica.md
Ultima actualizare a metadatelor	01.12.2010
Nota	Metadate mai detaliate sunt disponibile la adresa: http://www.statistica.md/public/files/Metadate/Populatia.pdf ***Serii de date cu informa□ie privind Ținta ODM sunt disponibile la adresa:*** http://www.statistica.md/pageview.php?l=ro&idc=421&id=3199

26 july 2011