

THE DATA TO INDICATOR (MIS)MATCH: EXPERIENCES FROM TRYING TO STRENGTHEN THIS LINK IN THE HEALTH INFORMATION SYSTEM IN TAJIKISTAN

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Abstract: In the context of health systems generally, and public health in particular, indicators are a specific tool for programme management, including for the analysis and diagnosis of problems and to guide the formulation of relevant corrective action. A key challenge facing the process of generation and use of indicators in developing countries is that there tends to be a significant indicator-data mismatch implying that either indicators are not or can't be calculated with the data (not) being routinely collected or the poor quality of the underlying data which makes the generated indicators unreliable. Drawing on case material from Tajikistan's existing HIS we applied framework of three dimension of (1) completeness, (2) fittingness, and (3) actionability to define ways to improve indicator-data match. The key argument being made in this paper is that if nations are to meet the promised MDGs, then they need to improve this indicator-data match. With this in mind, the aim of this paper is thus twofold: 1. To understand the nature of this indicator-data mismatch; and, 2. To develop practical approaches on how this mismatch can be improved.

Keywords: Indicator, MDG, Health Information System, Framework, Actor Network Theory

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1. INTRODUCTION

On September 6th, 2000, at the Millennium Summit a large gathering of world leaders adopted the UN Millennium Declaration, committing their nations to a new global partnership to reduce extreme poverty and setting out a series of time-bound targets, with a deadline of 2015 that have become known as the Millennium Development Goals (MDGs). Three of the 8 MDGs identified were directly related to health care: reduce child mortality (MDG4); improve maternal health (MDG5); and, combat HIV/AIDS, Malaria, and other diseases (MDG6). Each of these goals are measured through specific indicators, which have to be accurately measured and monitored in order to evaluate how respective nations are achieving their MDGs. However, in order to do this, the specific numerators and denominators that go into the formula for the calculation of the indicators need to be accurately captured, aggregated and computed using the formula. The generated indicators then need to be interpreted and analyzed by the concerned health programme managers to take appropriate interventions in order to make timely corrections. The data which make up the numerator and denominator are usually provided by the national routine Health Information System (HIS) of a country. A key challenge facing the process of generation and use of indicators in developing countries is that there tends to be a significant indicator-data mismatch implying that either the indicators cannot be calculated with the data being routinely collected or the poor quality of the underlying data means that the indicators generated are not reliable. A key argument made in this paper is that if nations are to meet the promised MDGs, then they need to improve this indicator-data match.

With this in mind, the aim of this paper is twofold: 1. To understand the nature of this indicator-data mismatch; and, 2. To develop practical approaches on how this mismatch can be improved. The empirical setting within which these issues are explored is the Tajikistan health system, which is also a signatory to the MDG declaration. Specifically, an analysis has been conducted of their national HIS to understand its capability in being able to provide the necessary numerators and denominators required for the generation their key indicators. This analysis is carried out at two levels. Firstly, a broader analysis of the national HIS to study the existing structure and flows of the information within the health system. Secondly, and more concretely the database comprising of the national HIS is carried out to understand specifically the nature of the indicator-data mismatch. This analysis then provides the basis to develop practical strategies on how to address these gaps to strengthen the systems such that more accurate and actionable indicators are made available to health managers responsible for strengthening health services delivery.

2. THE NATURE OF THE INDICATOR-DATA LINKAGE

In the context of health systems generally, and public health in particular, indicators are a specific tool for programme management, including the analysis and diagnosis of

problems and also for taking corrective action. Indicators are abstracted knowledge from broader information sets and composed of comparison on different relevant factors, or sometimes single units of information to support decision making processes or for measuring levels of achievements. For example, the indicator of full immunization coverage is broadly a measure of the effectiveness of the immunization program indicating what percentage of live births taking place in a particular catchment area have got all their vaccination shots (BCG, TT, DPT etc) in a pre-specified time period (less than 12 months). The national level for example can take the immunization coverage of a state and compare it with other states and also over time as a measure of performance and use this analysis to take decisions like which state needs what kind of vaccine stocks and when. These figures have to be also reported by the national level to international agencies like GAVI and WHO that monitor a nation's progress with respect to the MDGs. Similar analysis can be conducted at the state and sub-state levels, where the immunization coverage indicator may also be supplemented with some other specific monitoring indicators such as BCG-TT drop out rate which reflects what percentage of the children who took their BCG shot did not take their TT shot. Such detailed monitoring indicators like drop out rates are required to better manage service delivery while immunization coverage is used more as an "impact" indicator to study how the overall program is doing with implications for health policy.

The above examples illustrate at least two points. Firstly, with different levels of the health administration (from sub district to district, state, national and international), the types of indicators used vary, and also to the kind of use they are put to. Secondly, each indicator has a specific numerator and denominator. In the first example, the numerator used in "total number of children fully immunized" while in the second the numerator is "Total number of children who received TT shots MINUS Total number of children who received BCG shots." Similarly, the denominators also vary with the first example using "Total number of live births" and the latter "Total number of children given BCG shots." In both cases the factor used in %. Given this, it is imperative that the numerator value is being provided by the HIS, implying that the data element "Total number of children fully immunized" is included in the forms being filled in every month by the health workers, and the data being filled against this data element is of good quality. If that is the case, we can say one dimension of the indicator-data match, let us call it "completeness," is adequate.

Another dimension of this match can be identified when we take the health systems perspective whereby we look at all the health programs say that a particular district has to administer. Suppose, there are ten such programs and each of them have 2 indicators, then at least 20 numerator and 20 denominator values would need to be provided by the HIS. And if we further assume that each numerator and each denominator is made up of one data element, the HIS should periodically provide data on 80 data elements on a timely basis to the health program managers. If the HIS is providing data on exactly these 80 elements, then it can be seen to be a precise and actionable HIS. However, if it provides data on say 200 data elements (including the above 80) then the HIS can be described as a "redundant" system. And if some or all these 80 data elements are not

included (in the 200) in the HIS, it can be described as both a “redundant and inefficient” system. Let us call this dimension of the indicator-data match as “fittingness.”

While the dimensions of completeness and fittingness give us a sense of the data supply end, another key facet concerns how the indicators are understood and used by the health program managers for supporting their everyday action. Let us call this dimension “actionability” of the indicator-data match. While the generation of indicators can be seen as a necessary condition for their use, they are not sufficient. To provide it with the property of sufficiency, the indicators should be easy to understand, well presented, and the decision makers should have the capacity and the will to understand and use the indicators. This may be the hardest aspect of the indicator-data match, as building it requires large and sustained investment in building capacity of the information users on the use of information. This involves a cultural shift from using data just for the generation of tables of aggregate numbers for upward reporting to the generation and use of indicators for local action (Braa et al 2004).

The three identified criteria of completeness, fittingness, and actionability, taken together provide us with the basis of an analytical framework to examine the indicator-data match. Further, these three criteria are interconnected, because for example if fittingness is poor, so will be its actionability because if the indicator cannot be generated in the first place, it inherently cannot be used and be actionable. This analytical framework is applied to the empirical data on the indicator-data match drawn from the Tajikistan study.

3. RESEARCH METHODS

The research methods adopted were aimed at firstly gaining an understanding of the broader situation of the HIS in Tajikistan, and then, secondly, to concretely analyze the indicator data linkage.

3.1 Situation analysis

With regards the situation analysis, the empirical setting was defined by an existing initiative by the Asian Development Bank (ADB) that was supporting the Tajikistan Ministry of Health through the creation of an institutional structure called Health Sector Reform Project (HSRP). The HSRP became the focal point through which technical assistance was being channeled to the Ministry on various areas, including HIS which is the focus of this paper. One of the authors of the paper was invited by the ADB to support this process of HIS reform which had been ongoing over the last couple of years. The various previous efforts, such as studies by consultants or project reports of HSRP were studied in depth to get a sense of the status of the existing efforts. The national HIS consultant at HSRP was a crucial link in this process that could provide continuity to the events and narrate the past and help to focus on the current needs. Numerous discussions, formal and informal, between the first author and this consultant helped to gain a sense of coherence to the various pieces of the story. For example, she described how a Pakistani consulting group had been hired by HSRP to develop the strategic conceptual framework for the national HIS reform. The mandate now was to take this framework as the point of

departure, and try to move towards actually developing and implementing a computer based HIS. Reading the report of the Pakistani group proved invaluable in getting an understanding of the framework. Similarly, reports of the HSRP efforts, such as around the rationalization of the indicators which involved a reduction from 1300 to 833 indicators provided concrete information on which indicators were relevant to the national ministry. Some of the other reports referred to were: “Health for all to 2005” national strategy (1997), National programme of health care reform (1998), AIDS prevention (1993), and the Law on Health Protection of the population (1997).

After gaining an overview of the background, personal interviews were conducted with various program level managers at the national level, plus staff at the Medical Statistics division who were responsible for the operation of the HIS. The program level managers included immunization, maternal health, HIV/AIDS, tropical diseases, epidemiology and TB. In total, about 15 interviews were conducted, each lasting about 90 to 120 minutes, and involving a translator. Each interview was conducted in Russian, and the translator first translated the questions posed by us, and then the answers. The translated answers were noted in a diary that was then subsequently elaborated upon as field notes. It is interesting to point out that while the native language of the respondents was Tajik, their medical education had been carried out in Russian. So, they were much more comfortable in answering technical questions in Russian rather than in Tajik. Also, contributing to the situation analysis was a detailed study of the existing data recording and reporting formats. There were nearly 37 data recording formats each of them containing multiple sub formats. For example, one of their reporting formats had more than 50 sub formats running to more than 100 pages. The bulk and redundancies of the formats and data were a potent reflection of the existing data-indicator mismatch. At least three sets of presentations were made by us to audiences at the HSRP, the national Ministry of Health, and at a national workshop. The comments received during these presentations and the ensuing discussions helped in the fine tuning of the situation analysis. A final report of more than 150 pages submitted to the HSRP and ADB elaborated in detail on the overall analysis.

3.2 Database analysis

A copy of the database was obtained through HSRP which included the data being entered in the HMIS from 6 pilot districts where the HMIS was being implemented. This database was analyzed firstly for identifying duplicate data elements (same data being recorded in different forms) and also redundant data elements (for example, data elements that recorded “Totals” of a particular category and also the various “Totals” of the different sub-categories. To identify the data-indicator (mis)match, we took the 833 indicators and their respective formulas (numerator and denominator) as the starting point. Then working backwards, we tried to identify whether the numerator and denominator required for the calculation of the indicator were included in the database or not. Following from this, we could also identify which of the data elements that were currently included in the database were actually being utilized for the calculation of an indicator. Interestingly, this led to an estimation of a figure of nearly 90% of “un-utilized” data elements, reflecting the gross data-indicator mismatch.

Following this brief description of the research methods employed, the case study is presented.

4. CASE STUDY

4.1 Case setting

The empirical setting for this research is Tajikistan, a country located in Central Asia with a territory of 143,100 square kilometers, population of 6.7 million (UN, 2007) that shows an annual growth rate of 3.0%. Nearly half of population is below the age of 15 years. The Republic of Tajikistan is governed by the President and an elected Parliament, and is administratively divided into the capital – Dushanbe city, four regions (called “viloyat”), which in turn are divided into sixty seven districts (called “nohiya”), that have further smaller municipal areas called “jamoat”. After independence from Soviet Union in 1991, Tajikistan faced a grueling civil war in which up to 50,000 people were killed and over one-tenth of the population fled the country. This unrest ended in 1997 with a United Nations-brokered peace agreement. The abrupt breakdown of the centrally managed Soviet system and the consequences of the civil war contributed to a poor economy, damage of the public utility systems of water supply and heating, which magnified the spread of various communicable diseases. A recent WHO report indicated a decrease in life expectancy owing to poor nutrition, polluted water, and increased incidence of malaria, tuberculosis, typhoid, cholera, and cardiovascular diseases (WHO 2008).

Despite the independence from Soviet Union, it can be said the health system has continued thus far with few structural changes, and still comprising of the Ministry of Health, and its regional and district offices. There are specialized hospitals at the national level for more complex care, hospitals at regional and district levels, with health centers and health stations at the municipality level. Some ministries and government agencies have their own specific hospitals. Even with respect to the HIS, we see the legacy of the Soviet system still dominant with a high focus on the collection of statistics and their centralized compilation and reporting as an annual statistical exercise at the national level. While the Soviet legacy lives on in terms of this focus on statistics, the supporting systems of expertise required for statistical analysis is much more limited than what existed pre-1991.

In the existing HIS, the existing information flow started with the primary instruments of recording forms (258 in number) which provided the basis for the generation of 37 reporting forms, which were then sent up various levels to the national statistics and the State Statistical Committee for the calculation of various required statistics. The reporting forms were designed for the historically existing paper based systems underlying the Soviet system logic of centralized management. Redundancies were rampant, for example there were data elements for “Total” of a particular disease under different age categories, while also having different total figures for each of these age categories. This

made the Total figure (of all categories) redundant as it should be calculated rather than a manually entered field.

Through the interviews conducted, various common themes were identified with respect to the HIS. A key theme concerned how the existing HMIS was primarily data driven and not action led, implying its primary focus on reporting for meeting the needs of the bureaucracy rather than on the analysis and use of information for action. The focus of the HIS was on the collection of statistics, which at the end of the year was used for the annual compilation of a comprehensive health statistics book. While there were approximately more than 30,000 data elements being collected through the information system, very few indicators were generated. While through the reform process undertaken by HSRP, a total of 833 indicators were identified, these had still as yet not been operationalized into the HMIS.

There was extreme fragmentation of information flows, with multiple parallel and uncoordinated flows inherent with redundancies and duplications. For example, under the TB program some provinces (Oblasts) entered data in EpiInfo and sent it to the national level TB centre. Since the data format in which the national Medical Statistics division wanted was incompatible with EpiInfo, the national TB center manually copied the data from EpiInfo into a paper format, transmitted it manually where it was entered into the MedStat program. Further, there was no hierarchy of information recognized, and all the data collected at the lower level flowed to the Republic level with limited abstraction and analysis. The focus on upward reporting lent itself to almost no feedback aimed at improving action and also increasing the motivation of staff who only saw their task to collect and transmit upwards huge amounts of data. Table 1 shows number of data elements contained in each form. As pointed out earlier there are 37 forms (for data entry and which also serve as report formats), and in each form there are multiple categories, or what can be described as “sub-forms.” In the table below, the first column gives the form number (from 1 to 37), and the second column enumerates the number of data elements by all categories.

Form Number	Number of Data Elements X Categories	Form Number	Number of Data Elements X Categories
1	1298	17	406
2	208	18	13495
3	156	20	412
5	134	30	1836
7	1157	31	269
7H	156	32	475
8	336	33	311
9	340	34	348
10	220	35	994
10A	76	36	375
11	200	37	272
12	3027	39	249
12A	153	40	43
12O	132	41	56
13	96	42	22
14	1266	45	10
15	68	47	2886
16	60	71	12
Grand Total	31554		

Table 1. Number of data elements by form for all categories.

As the above table indicates, a vast amount of data was expected to be collected by the field staff. However, on an examination of the data in the Messtat database provided to us (for 2005/6), we found a high percentage of this data being left as blank or filled as zero. The table below gives an example of the high percentage of such blank/zero values.

Form Number	Table Name (multitable forms)	Number of entries	Number of zero/missing values	% of zero/missing values
1	Infectious disease	76370	66153	86.62
	Parasitic diseases	8576	6913	80.61
	Hospital acquired diseases	11286	11127	98.59
5	Reproductive health facility activities	1360	148	10.88
	Contraceptive resources	3060	1483	48.46
	Contraceptive health	3672	1426	38.83
	Contraceptive assistance	3264	627	19.21
7		91403	82645	90.42
8		22848	16158	70.72
9		26928	23352	86.72
10		16214	13243	81.68
10D		7548	6702	88.79
11		15488	14303	92.35
12		692736	542084	78.25
12D		17226	13306	77.24
12O		11154	6741	60.44
13		11232	8920	79.42
Total		1020365	815331	79.91

Table 2. MedStat database zero/null values

As the above table indicates, the percentage of missing/zero values is approximately 80% with Form 7 and 11 even indicating an average of greater than 90%. This extraordinary high percentage raises the question of whether this data is required and if they are used for any indicator calculation and identification of action points.

The formats for reporting were poorly designed, containing numerous tables, sub-forms and sometimes even a thousand data elements. In the same form, no distinction was made between annual and monthly data, or between data required for diseases and those on infrastructure and staff. Such data was hard to be used for formulating actions for correction. Same data was reported in different forms, for example Form 30 and 32 had identical data elements regarding maternal health and child mortality.

The current HMIS software being used at the national level was called MedStat, which was developed using Microsoft Visual FoxPro and deploying .dbf tables for data storage. MedStat was poorly designed and represented just an electronic reflection of the paper based system, with all its existing inefficiencies. The example of “Total” provided above, although originally designed to support the logic of a manual system, was also mirrored in the software. The software had no functionalities for indicator calculations and other visual analysis tools such as graphs and charts. In summary, the software was outdated, poorly supported, and grossly inadequate for the generation of indicators, and their linking to specific organizational units.

For the analysis of the database to understand the data-indicator linkage, we first studied the list of indicators mandated by the Ministry. There were 834 indicators grouped into 6 main categories: demography, healthcare resources, environment, healthcare services, MDG and life style. In general we found that the data available from the 37 report forms could be used to calculate approximately 40% of these indicators. For example, the indicator “*Obstetric aid rate with the participation of specially trained health workers,*” related to MDG5, required data from different sources: Forms 30 (Report on treatment of prophylactic activity of facility), 32 (Report on medical aid to pregnant, parturient and puerperal women) and 16 (Report on collective farm medical centers). Form 30 contained from both facility and service data, while 32 contained data elements related to maternal and child health. There were duplications of data leaving the situation ambiguous of what data should be used for which indicator calculation. Many indicators in the list were based on surveys (and not routine data) or were the responsibility of other State Agencies, mainly from the Republican Statistical Bureau (RSB). Table 3 below demonstrates percentage of data coverage of indicator needs, to summarize the indicator data mis(match):

Indicator Groups	Qty of indicators in group	% of data availability from existing data elements (apr.)
Demography	353	30
MDG	12	50
Life Style	28	20
Environment	89	5
Health Conditions	224	90
HC Resources	128	70
Average		44.17

Table 3. Indicator data match by indicator groups

After presenting the results of the situation analysis and the database analysis, we now move to the discussion section where we examine the indicator-data match, using the three dimension framework of completeness, fittingness, and actionability.

5. DISCUSSION

5.1 Completeness

The dimension of completeness refers to the gap between what data is required for the generation of indicators and whether that data is being provided for by the routine HIS. The data presented in Table 3 indicates that only about 45% of these data needs are met. This gap is especially high with respect to indicators on Environment, Lifestyle and Demography. The reason for this could be these indicators are not directly the mandate of the health department who are therefore not capturing the data. Only about 50% of the data required for the generation of the MDGs are currently being collected.

5.2 Fittingness

Our analysis reveals an extremely poor fit with respect to the data-indicator linkage. On an average, the number of data elements used in an indicator calculation is 2. So, for the currently defined 834, we need a total of about 1668 data elements. Further, if we assume that each data element has on an average 8 categories (taken on the higher side), we require a total of 13,344 data element units, which represents 42.3% of the current Tajikistan HIS size (31,544). This implies that 57.7% of the existing data elements have no value for indicator calculations, and are hence redundant. This redundancy reflects a very poor fit between data and indicators. Further, in many cases, the data collected is not relevant with respect to the indicators being generated. For example, the MDG6 indicator calculation (United Nations 2001) requires data on women in age category of 15-24 years, whereas the Tajikistan HIS provides 15-19 years data.

5.3 Actionability

The current HIS is extremely poor on the dimension of actionability on at least two counts. One, no indicators are currently generated from the existing Medstat system. However, from this system, some of the data elements are extracted and fed into another system (called DPS – Data Presentation System), and about 5 indicators are generated

which are uploaded on a WHO system. These indicators are not made available to the lower level program managers to support their everyday monitoring and evaluation purposes. These 5 indicators may be using less than 50 out of the 31,544 data elements (less than 1%) reflecting the high degree of non-use of data for action. Two, all the data which is collected by the lower levels are fed to the national level with no degree of abstraction and aggregation. If we go by the basic principle that the lower levels are responsible for monitoring related action, and the national level for evaluation and impact analysis, then they should receive different kinds of data and indicators for their respective action. However, that is not the case in the existing system, implying a high degree of lack of actionability. Furthermore, the number of indicators proposed by MoH (834) covers too large a spectrum to be directly relevant to the health care system, such as related to lifestyle. From the perspective of, for example, the monitoring of MDG related indicators, the existing ones are only peripherally actionable.

6. CONCLUSIONS

We have explored existing data used in the Tajikistan HIS using a proposed framework of interdependent dimensions in order to discover overlaps, duplications and ambiguities that adversely influence data quality more broadly and with it the data-indicator linkage more specifically. The analysis shows that the existing data elements being generated by the HIS are not useful, relevant and actionable with respect to the operationalization and use of indicators. If Tajikistan, and also other nations, need to achieve the prescribed MDGs (MDG 2004), the HIS should support a more effective monitoring of the progress on specified parameters, based on the strengthening of the data-indicators match on the three key dimensions identified in the analytical framework.

Addressing this mismatch could be guided by Braa et al's (2007) proposed strategy of "Flexible Standards" for HIS in developing countries based on complexity science (Holland 1995; Holland 1998). This approach involves defining a hierarchy of data standards for different levels of the health administration, with the lowest level (the community) requiring the most disaggregated level of detail and the highest (the national) most aggregated. Each level further has the freedom to add locally relevant data and indicators as long as they don't delete those that are required for the level above. Each level then has their own "essential dataset" that has a clear match with the indicators required to be generated at each level. To apply this principle, Tajikistan will need to define the MDGs (and other nationally required indicators) as requirements for the highest level (and with it the corresponding data sets). The level below (say viloyat) then must necessarily collect the data required for the generation of the national core indicators, plus they can add those indicators that their level requires and with it the required data elements. Similarly, the hierarchy principle applies for the levels below. However, creating this order as complexity science guides us (Dooley 1997) is an emergent rather than a predetermined process in which outcomes are often largely unpredictable. To engage with this process, Braa et al (2007) argues to identify the agents who can be seen as semi-autonomous units that seek to maximize some measure of goodness, or fitness, by evolving over time. An example of an attractor could be the norm of an "essential data set" that reflects an effective compatibility on the dimensions of

completeness, fittingness and actionability with respect to the data-indicator linkage. Creating and spreading this attractor is a politically fraught process, and requires ongoing political negotiations with the different stakeholders who may “own” different components of the HIS. Tajikistan needs to set up such a process of political negotiations but guided by the principle of the flexible standards to try and strengthen the data-indicator linkage and with it the monitoring and evaluation mechanisms towards reaching the MDG goals.

7. REFERENCES

Braa et al 2004. Networks of Action: Sustainable Health Information Systems Across Developing Countries, MIS Quarterly Vol. 28, No 3, pp. 337-362/September 2004

Braa et al 2007. *Developing Health Information Systems in Developing Countries: The Flexible Standards Strategy*, MIS Quarterly Vol. 31 Special Issue /August 2007

Dooley, K. (1997): "A Complex Adaptive Systems Model of Organization Change," *Nonlinear Dynamics, Psychology, & Life Science*, Vol. 1, No. 1, p. 69-97.

Holland, John Henry (1995). *Hidden Order: How Adaptation Builds Complexity*. Reading, MA: Helix Books.

Holland, John Henry (1998). *Emergence: From Chaos to Order*. Addison-Wesley, Redwood City, CA, ISBN 0-201-14943-5.

MDG (Millennium Development Goals) Needs Assessment Team Tajikistan. 2004. *MDG Needs Assessment Interim Report*. Tajikistan.

MoH (Ministry of Health) RT. 2002. *National Concept of Healthcare Reform of the Republic of Tajikistan*. Dushanbe, 2002.

MoH (Ministry of Health) RT. 2004. *Strategic Program on counteraction of HIV/AIDS epidemic within the system of the Ministry of Health of the Republic of Tajikistan for period 2004-2010*. Dushanbe.

MoH (Ministry of Health) RT. 2003. *Program on Combating Tuberculosis in the Republic of Tajikistan, (DOTS) for 2003-2010*. Dushanbe.

MoH (Ministry of Health) RT. 2005. Recommendation of Working Groups of the Ministry of Health of RT. *Primary Healthcare System, Immunization, Formation of healthy Living, Malaria, HIV/AIDS, Tuberculosis, Helminthes*.

United Nations (2007), *Human Development Report 2007/2008*, United Nations Development programme 1 UN Plaza, New York, New York, 10017, USA, ISBN 978-0-230-54704-9.

United Nations (2003). *Indicators for Monitoring the Millennium Development Goals* ST/ESA/STAT/SER.F/95, United Nations Publication, Sales No. E.03.XVII. 18, ISBN 92-1-161467-8, United Nations 2003

United Nations (2001). *Indicators of Sustainable Development: Guidelines and Methodologies*. Sales No. E.01.II.A.6. Available from <http://www.un.org/esa/sustdev/natlinfo/indicators/isd.htm> .

United Nations (2003). *Millennium Indicators Database*. Statistics Division Internet site <http://millenniumindicators.un.org>.

WHO Regional Office for Europe, 2000, *Health Care Systems in Transition – Tajikistan 2000*, European Observatory on Health Care Systems, Copenhagen

WHO 2008. *World health statistics 2008*. WHO Library Cataloguing-in-Publication Data, ISBN 978 92 4 156359 8 (NLM classification: WA 900.1)