

Seoul, Republic of
Korea
10 - 16 October 2009

*Use of ICD-10 for morbidity and mortality
notification for in-patients, in recourse
limited settings. The experience of
Mozambique using reduced disease lists.*

WHO-FIC 2009/D032

Authors: Roberta Pastore (1), Alessandro Campione (4,6), Bernardina Gonçalves (2), Armando Melo (3), Celia Goncalves (4), Carla Silva Matos (5), Marcelino Mugai (4)

- (1) World Health Organization, Mozambique Country Office, MoH Mozambique
- (2) Malavane General Hospital, Maputo, Mozambique
- (3) Central Hospital of Maputo, Mozambique
- (4) Department of Health Information, Ministry of Health, Mozambique
- (5) MD, Director, Department of Non-Communicable Diseases, Ministry of Health, Mozambique
- (6) PEPFAR, Mozambique

Roberta Pastore: MD, Technical Officer for TB and HIS
Bernardina Gonçalves: MD, Pediatrician
Armando Melo: MD, Medical Director
Celia Goncalves: MD, Director of Department
Carla Silva Matos: MD, Director of Department
Marcelino Mugai: Technical Officer for HIS in the MoH
Alessandro Campione: MD, Technical Officer for HIS in the MoH

Abstract

The Mozambique health information system is paper-based and provides access to limited indicators of public health importance. In 2006, ICD-10 was adopted by the system and four pilot projects were implemented to provide facility-based mortality and morbidity data for public health use. Lists of selected diseases, included in paper forms for aggregated data, are used for hospital morbidity and mortality surveillance. The system is highly accepted by practitioners, it is easy to use and implementable nationwide. Data are used to improve hospital management and to elaborate health facility profile reports.

The Mozambican context

With a population of 20.5 million, Mozambique is the 7th largest country in Sub-Saharan Africa. In 2005 nearly 70% of the population was rural; the illiteracy rate was 60%. Since 2000, Mozambique has been surprisingly successful in terms of fostering macro-economic growth, improving welfare, and extending access to public services [1]. Despite this progress, in 2005 the percentage of poor people in Mozambique was still 54% and the country was ranked 172nd out of 177 countries with available data on the human development index. Total health expenditure per capita in Mozambique is well below the target recommended by the WHO Commission on Macroeconomics and Health to provide a basic package of services in low-income countries. As for 2007, government expenditures on health were about 9% of total government expenditures¹.

In 2007 the Service Availability Mapping counted a total of 1,277 health facilities, of which five quaternary hospitals (including two psychiatric hospitals), 7 tertiary hospitals and 41 secondary hospitals, quaternary hospitals being the most specialized level of care; the primary level of care is constituted by 1224 health centres and health posts [2]. This is corresponding to an average coverage of 501,000 people per secondary hospitals and 17,000 people per health centre. Only 53% of all health facilities, and only 10% of level II hospitals, have running water. While all hospitals have electricity, only 36% of health centres have it; the source of energy is via regular public utilities in only 55% of facilities. Diagnostic services are also very scarce: only 16%, 5% and 2% of health facilities have access to laboratories, X-rays and ultrasound scans, respectively. In total 23% of health units (ranging from 4 to 56% in different provinces) have communication devices and only 4% have access to internet. The availability of human resources stands as a critical factor. Of a total of 26,036 employees in the health sector, 38% are general support staff, 43% have basic or elementary training, 17% have a medium/high level degree in nursing or medical sciences, and only 2% are medical doctors (corresponding to one medical doctor or medical technician per 16,968 inhabitants). Four provinces (Maputo city, Nampula, Zambézia and Sofala) have more than half of the overall workforce in the country; 46% of the medical doctors and 7% of the basic level staff work in Maputo city alone.

The Health Information System and international standards

The Health Information System (HIS) in Mozambique, similar to the overall health system, is facing numerous challenges. The outstanding problems include poor data quality and inadequate analysis and use of data, mainly due to insufficient and/or poorly-trained dedicated staff at all levels, scarce financial resources and informatics technologies and communication, and inadequate supervision and feedback².

The HIS is paper based and the different existing subsystems capture information on service delivery rather than patient-centred information; informatics technologies are available at the provincial and central level only, and they are mainly used to manage aggregated data from the district level. Analysis of data and integration of the subsystem is strongly hampered by the poor implementation of information standards in the HIS.

¹ Source of data: Ministry of Planning and Development (MPD)/Ministry of Finance (MF), 2008, Medium-Term Fiscal Scenario 2009-2011; MoH, 2007, DAG Annual Report 2007

² As per several HIS assessments done in 2000-2008 by Faculty of Medicine and MoH of Mozambique, HMN, WHO, EUROSIS, among others.

Until 2006 no standard for disease classification was used. This impeded construction of a system that could provide useful morbidity and mortality data. Data on morbidity and mortality were available only from some subsystems focused on health conditions related to maternity and certain infectious diseases. Moreover, civil registration in Mozambique does not provide representative data, not even on crude mortality (available from census and surveys) because of extremely low coverage. The only available data on causes of death come from *ad hoc* studies [3,4,5,6,7]. Morbidity and mortality data are becoming more and more important for public health purposes, especially considering the increased burden of chronic diseases, partially fuelled by the HIV epidemic (national prevalence of HIV infection is 16%)[8]. MoH evaluated various classes of systems and while some were partially applicable to the Mozambican context [12,13,14,15] other were found to be infeasible [9,10,11]. Therefore, in 2006 the Ministry of Health officially adopted the ICD-10 and ICF as standards and started to plan their implementation. The design of the implementation models had to face the numerous limitations of the health system (human resources, finances, infrastructure, ITC, alignment with the national plan for poverty reduction, etc), as described above. With the aim to provide data for public health use, the MoH initiated several projects, namely:

- 1) Morbidity and mortality surveillance for in-patients through lists of selected diseases, to scale up nationwide by the end of 2010.
- 2) Mortality registers for in-patients of Maputo Central Hospital (HCM) using the whole ICD-10; to scale up to all hospitals nationwide by the end of 2010.
- 3) National death certificate with an annexed reduced list of basic causes of death, to be used if the certifier has no acquaintance or access to the whole ICD-10.
- 4) National Survey on causes of death through verbal autopsy (INCAM) based on deaths reported in the 2007 population census.
- 5) Assessment, through ICF, of Functioning and Disability of paediatric patients in one level II hospital in Maputo Province.

In this paper we will focus on the development process of the nationwide morbidity and mortality surveillance for in-patients through lists of selected diseases coded with ICD-10.

Methods

Before the official adoption of ICD-10 in Mozambique, this standard had already been independently introduced by some research centres [16] and hospitals to produce statistics on causes of discharge and death within the hospital. Among other examples, the experience of Quelimane Provincial Hospital, Maputo Central Hospital and Mavalane General Hospital stand out. The three hospitals opted for the implementation of reduced lists of diseases coded with ICD-10. The choice was motivated by constraints like lack of adequately trained staff, high staff workload, no computers available and no existing patient-based registration system. The decision was also motivated by the South African experience and collaboration [16]. The lists in use were elaborated on the basis of clinical experience, selecting the most frequent diseases, and they were refined overtime through representativeness checks, for instance count of cases classified as “other cause”, fittingness of codes attributed to the patient’s file, etc. In Mavalane Hospital the project is ongoing for the past three years, obtaining good results in terms of data produced and feasibility and acceptability of the system.

In 2008, taking stock of those experiences, the MoH decided to define national lists of causes of discharge and death for hospital in-patients. The objective was to elaborate a tool to set up a morbidity and mortality surveillance system to provide information to decision makers at all levels of the National Health System. The lists had to i) be differentiated between level III-IV and level II hospitals; ii) be organized by ward within each existing department; iii) include a maximum of 30 items to be viable in a paper based system. In October 2008 the MoH organized a national workshop to draft the lists. The primary stakeholders, including public health specialists, physicians working at hospital level, researchers and partners, were included in order to ensure consensus among future users. The participants were divided into 5 groups (general medicine, surgery, gynaecology and obstetrics, paediatrics, orthopaedics). There was also a sixth group working on the list for the national death certificate. Some of the participants took part in committees created to finalize and validate the lists. To support the selection of the causes of discharge and death a scoring system was created based on four criteria:

- 1) frequency of occurrence
- 2) public health relevance and mandatory notification
- 3) possibility to confirm diagnosis at the attendance level
- 4) usefulness for hospital management

The frequency of occurrence was estimated using available sources of data: statistics based on non-standardized data from HCM (very difficult and time consuming to analyze) and on ICD-10 local initiatives; preliminary data from the mortality register for in-patients of HCM using the whole ICD-10; study on causes of death through verbal autopsy; research studies. In total 13 data sources were used.

The attribution of public health relevance was based on the national policies for poverty reduction and for strengthening of the health sector and subjective opinion of the workshop participants. It was decided that diseases and conditions undergoing mandatory notification had to be included. The possibility to define diagnosis was discussed with the physicians and researchers, taking into account the diagnostic tools available by reference level of health facility, including availability of laboratory and anatomic-pathological confirmation within the national borders, and the level of education of health workers (specialized or general doctor, medical technician, medical agent³) by hospital level. The score attributed to usefulness for hospital management was mainly based on direct experience of the physicians participating in the workshop: they considered the weight of each disease in terms of cost, hospitalization length, staff time required, bed availability by service, etc. The specific committees checked the exact correspondence between disease description and ICD-10 codes, and addressed difficulties and doubts raised during the workshop, through several working group sessions, research and consultation with experts from WHO/HQ and Portuguese speaking WHO Collaboration Centres.

Results

Two sets of draft lists, one for II and one for III-IV level hospitals, were elaborated; each set included separated lists for causes of discharges and death. A document on methodology and guidelines for users were developed. Up to now the lists have been

³ In Mozambique, the *técnico de medicina* and *agente de medicina* have a basic medical training of 4 and 2 years respectively.

revised but only the lists for Paediatrics (for three wards at II level and 9 at III-IV level) and the list for the death certificate have been finalized and validated. Diseases and external causes were coded using categories or four digits codes (either single or intervals) as most appropriate. For some diseases or external causes some *ad hoc* codes have been used:

a) “Complicated malaria (all *plasmodia*)” we decided to use the code B53.80 standing for all the conditions falling under B50.0, B50.8, B51.0, B51.8, B52.0 and B52.8. The choice was motivated by the difficulties of distinguishing between the different plasmodia in the current practice. The choice to include complicated malaria instead of using intervals of codes (i.e. B50-B53) reflects the national surveillance definition and the recommendation to hospitalize only complicated cases to avoid hospital overload.

b) “Acute flaccid paralysis (AFP)” was coded as G83.80, standing for all the conditions falling under G37.3, G61.0, G82.0, G82.3 and G93.7. The AFP is defined to include such conditions that are mandatory to notify. We wanted to avoid using a terminology different from other national surveillance systems. Also, the specific diseases corresponding to AFP syndrome are difficult to diagnose, especially at II level hospitals.

c) “Acute otitis media” was coded as H66.90, grouping the acute serous, other acute nonsuppurative, and acute suppurative otitis media (H65.0, H65.1, H66.0), reflecting particularly the interest of paediatricians.

d) “Complications caused by the use of traditional medicine” was coded with U50. In the ICD-10 there was no code fitting this specific external cause. This is a very important cause to be reported as a large majority of the population turns to traditional medicine that uses a variety of substances and a range of practices (scarification, cuts, etc) that are difficult to categorize using the existing ICD-10 codes. Moreover, having a unique code will be more useful to provide data for public health interventions.

In each list we added the code 1111 for “Other cause”, for all the causes not included in the lists, to ensure that the morbidity and mortality statistics would be complete. For each “Other cause” it has to be specified in which ICD-10 chapter the condition occurs. In the first year of implementation of the reduced lists, the “Other cause” will be analysed in details to check the quality and the representativeness of the reduced lists.

The validated lists of Paediatric, as well as an explanatory document, are available for the public on the website of the MoH.

As a first step, the lists have been distributed to all the provinces and a close follow up of their use is ongoing in some hospitals in Maputo; they have been included in a paper form to report daily aggregated data on morbidity and mortality on a monthly basis. Software to enter the monthly data and prepare statistics and reports is under development. As already said, the lists will be further assessed on the bases of the first year’s results. The consolidation of the national system is planned for 2010.

Discussion and Conclusions

The adoption of ICD-10 and ICF as standards for diseases classification has been an important milestone in the process to strengthen the HIS in Mozambique and it has highlighted the need to introduce a national policy for standards introduction (terminology, dataset, IT standards, etc). However, the implementation of the standards in a limited-resource setting such as Mozambique is not easy, since the standards often seem

to be conceived and designed for developed countries. In countries like Mozambique the constraints for a good use of the full ICD-10, even in hospital settings, are many; for instance patients are often attended solely by medical technicians or agents with limited diagnostic capacity, there's no access to the online version of ICD-10, the books are yet not available and too expensive to buy. An extensive capacity building on the ICD-10 would be extremely demanding. Training and recruiting coders in each hospital is an option that is difficult to adopt because of resource constraints; MoH struggles to include in the payroll newly appointed staff that would be needed in many areas. Moreover, information technologies are a good support in the use of ICD-10 but in Mozambique they are very poor and the cost to expand and maintain them is extremely high. Those constraints, among others, induced the MoH to explore a simplified methodology to use the ICD-10. The loss of accuracy due to the use of reduced lists is considered acceptable. In fact, the feedback from hospitals using the locally developed lists over the last three years and from all hospitals using the national lists over the last few months, shows a high acceptability by the users and data producers, easy to use, limited costs and no need for complex training. Preliminary data also showed the system to be usable and sufficient for enhancing hospital management. Staff was highly motivated and sensitized to the usefulness of standard codification thanks to the easy of data analysis and statistics production at data producers level. In fact, the national capacity to perform data analysis is very limited at all levels. The use of reduced lists to obtain aggregated data, allows timely elaboration of statistics and reports at all levels. Information provided is expected to cover at least 80% of all possible causes, responding to the need for mortality and morbidity data for public health purposes in a country with limited resources. One of the most important strengths of this system is the ability to be implementable nationwide in a short timeframe, allowing production of basic mortality and morbidity data within one year. The information loss due to the reduced lists often coincides with the information loss due to the impossibility to define the diagnostics with the precision required by ICD-10. For example, in Mozambique, nowadays the labs do not perform tests to distinguish between viral and nonviral hepatitis (we included hepatitis A and B in the reduced lists in anticipation of the national laboratory strengthening plans enhancing diagnostic capacity); availability of microbiological tests to confirm aetiology of clinical syndromes (i.e. diarrhoeas, dysentery, pneumonias, meningitis) is in practice limited to IV level hospitals, covering a minimal percentage of the population outside the research context [17,18,19,20]. The elaboration of reduced lists allowed the highlighting of some specific needs of the developing countries in terms of conditions and coding, which are not addressed by the ICD-10 (ex. consequences of traditional medicine, complicated malaria, malaria during pregnancy, etc). However, the use of reduced lists is considered a transitional solution. Systems using the whole ICD-10 already exist and they are encouraged when there are enabling conditions. Mozambique is supporting the training of coders and aims, in the long term to implement broadly the whole ICD-10, without limiting it to hospital settings, inpatients, paper based tools and data aggregation. Nonetheless the use of reduced lists of causes of discharge and death is a good compromise between ideal implementation of standards and feasibility and it seems a good model to implement in poor resource settings in a short- or mid-term perspective.

References

1. UNDP (United Nations Development Programme). 2009. *Human Development Report 2007/2008. Fighting climate change: human solidarity in a divided world*. Palgrave Macmillan, New York.
2. Ministério da Saúde, Inventário Nacional de Infra-estruturas de saúde, serviços e recursos, Moçambique 2007. July 2008, Maputo. http://www.misau.gov.mz/pt/misau/dpc_direccao_de_planificacao_e_cooperacao/departamento_de_informacao_para_a_saude/documentos_chave_do_sistema_de_informacao_para_a_saude/sam_inventario_nacional_de_infra_estruturas_de_saude_2007
3. Ordi J, Ismail MR, Carrilho C, Romagosa C, Osman N, Machungo F, Bombí JA, Balasch J, Alonso PL, Menéndez C. Clinico-pathological discrepancies in the diagnosis of causes of maternal death in sub-Saharan Africa: retrospective analysis. *PLoS Med*. 2009 Feb 24;6(2):e1000036.
4. Sacarlal J, Nhacolo AQ, Sigaúque B, Nhalungo DA, Abacassamo F, Sacoor CN, Aide P, Machevo S, Nhampossa T, Macete EV, Bassat Q, David C, Bardaji A, Letang E, Saúte F, Aponte JJ, Thompson R, Alonso PL. A 10 year study of the cause of death in children under 15 years in Manhica, Mozambique. *BMC Public Health*. 2009 Feb 24;9:67
5. Menéndez C, Romagosa C, Ismail MR, Carrilho C, Saute F, Osman N, Machungo F, Bardaji A, Quintó L, Mayor A, Nanche D, Dobaño C, Alonso PL, Ordi J. An autopsy study of maternal mortality in Mozambique: the contribution of infectious diseases. *PLoS Med*. 2008 Feb;5(2):e44.
6. Renzaho AM. Mortality rates, prevalence of malnutrition, and prevalence of lost pregnancies among the drought-ravaged population of Tete Province, Mozambique. *Prehosp Disaster Med*. 2007 Jan-Feb;22(1):26-34.
7. Nizamo H, Meyrowitsch DW, Zacarias E, Konradsen F. Mortality due to injuries in Maputo City, Mozambique. *Int J Inj Contr Saf Promot*. 2006 Mar;13(1):1-6.
8. Ministério da Saúde, Relatório sobre a revisão dos dados de vigilância epidemiológica do HIV, Ronda 2007. February 2008, Maputo
9. Dimick C. ICD-10 postcards. Canadians, Australians share experiences with ICD-10 implementation. *J AHIMA*. 2008 Mar;79(3):33-5
10. Schopen M. The implementation of ICD-10 in Germany - tools and information on the Internet. *Schmerz*. 2000 Apr;14(2):97-103. German.
11. Piselli C. What's your ICD-10 plan? Findings and recommendations from research on ICD-10 implementation. *J AHIMA*. 2005 Feb;76(2):34-7; quiz 39-40
12. Mony PK, Nagaraj C. Health information management: an introduction to disease classification and coding. *Natl Med J India*. 2007 Nov-Dec;20(6):307-10. Review.
13. Sayed HA, El Ayyat A, Ismail A. Development of mortality statistics at governmental hospitals, Egypt. *J Egypt Public Health Assoc*. 2003;78(5-6):397-415.
14. Kamadjeu RM, Tapang EM, Moluh RN. Designing and implementing an electronic health record system in primary care practice in sub-Saharan Africa: a case study from Cameroon. *Inform Prim Care*. 2005;13(3):179-86.
15. Safdari R, Meidani Z. Developing a model for an Iranian Classification of Diseases (IRCD) compatible with other adaptations of the International Classification of Diseases. *HIM J*. 2007;36(1):36-41.
16. Debbie Bradshaw, Pam Groenewald, Ria Laubscher, Nadine Nannan, Beatrice Nojilana, Rosana Norman, Desirée Pieterse and Michelle Schneider. Initial estimates

from the South African National Burden of Disease Study, 2000; MRC Policy Brief No. 1, March 2003

17. Adjuik M, Smith T, Clark S, Todd J, Garrib A, Kinfu Y, Kahn K, Mola M, Ashraf A, Masanja H, Adazu K, Sacarlal J, Alam N, Marra A, Gbangou A, Mwageni E, Binka F. Cause-specific mortality rates in sub-Saharan Africa and Bangladesh. *Bull World Health Organ*. 2006 Mar;84(3):181-8. Epub 2006 Mar 22. Erratum in: *Bull World Health Organ*. 2006 Apr;84(4):336. Adazu, Ubaje [corrected to Adazu, Kubaje].

18. Roca A, Bassat Q, Morais L, Machevo S, Sigauque B, O'Callaghan C, Nhamposa T, Letang E, Mandomando I, Nhalungo D, Quintó L, Alonso P. Surveillance of acute bacterial meningitis among children admitted to a district hospital in rural Mozambique. *Clin Infect Dis*. 2009 Mar 1;48 Suppl 2:S172-80.

19. Sigauque B, Roca A, Mandomando I, Morais L, Quintó L, Sacarlal J, Macete E, Nhamposa T, Machevo S, Aide P, Bassat Q, Bardají A, Nhalungo D, Soriano-Gabarró M, Flannery B, Menendez C, Levine MM, Alonso PL. Community-acquired bacteremia among children admitted to a rural hospital in Mozambique. *Pediatr Infect Dis J*. 2009 Feb;28(2):108-13.

20. Mandomando IM, Macete EV, Ruiz J, Sanz S, Abacassamo F, Vallès X, Sacarlal J, Navia MM, Vila J, Alonso PL, Gascon J. Etiology of diarrhea in children younger than 5 years of age admitted in a rural hospital of southern Mozambique. *Am J Trop Med Hyg*. 2007 Mar;76(3):522-7. Erratum in: *Am J Trop Med Hyg*. 2008 Jul;79(1):140.