Transactions of the Royal Society of Tropical Medicine and Hygiene xxx (2011) xxx–xxx

Contents lists available at ScienceDirect

Transactions of the Royal Society of Tropical Medicine and Hygiene

journal homepage: http://www.elsevier.com/locate/trstmh

Review

# Vital registration in rural Africa: is there a way forward to report on health targets of the Millennium Development Goals?

R. Zachariah[a,*], B. Mwagomba[b], D. Misinde[c], B.C. Mandere[d], A. Bemeyani[e], T. Ginindza[c], H. Cortier[f], K. Bissel[g], A. Jahn[h], A.D. Harries[g,i]

[a] *Médecins Sans Frontières, Medical Department (Operational Research), Brussels Operational Center, 68 Rue de Gasperich, L-1617, Luxembourg*
[b] *Ministry of Health and Population, Thyolo district Health services, Thyolo, Malawi*
[c] *Médecins Sans Frontières, Thyolo District, Thyolo, Malawi*
[d] *District Health Assembly, District Commissioner, Thyolo district, Malawi*
[e] *District Health Assembly, District Commissioners Office, (Monitoring and Evaluation Unit), Thyolo district, Malawi*
[f] *Maternal and Child health services, Médecins sans Frontieres, Brussels Operational Centre, Belgium*
[g] *International Union against Tuberculosis and Lung Disease, Paris, France*
[h] *International Training and Education centre, Seattle WA, USA*
[i] *London School of Hygiene & Tropical Medicine, London, UK*

ARTICLE INFO

*Article history:*
Received 25 July 2010
Received in revised form 2 March 2011
Accepted 2 March 2011
Available online xxx

*Keywords:*
Vital registration
Millennium Development Goals
Deaths
Village
Malawi

ABSTRACT

Vital registration - the systematic recording of births and deaths - has both legal and health significance. In particular, accurate recording and reporting of vital statistics are public goods to enable the monitoring of progress towards achieving health related targets of the 2015 United Nations Millennium Development Goals (MDG). The reality in Africa is that most births and deaths cannot be traced in legal records or official statistics and as such, there is currently no way of assessing progress towards achieving MDG targets and this applies particularly to rural settings in Africa.

From the context of a rural district in Malawi, we describe an informal traditional system for the reporting of deaths at village level, and discuss the potential opportunities, challenges and ways forward in the wider implementation and interpretation of vital data generated by such a system.

Such a system might provide an interim solution for accelerating the production and use of district level vital statistics for legal, administrative, statistical purposes and to report on the MDG in rural Africa while waiting for more comprehensive national systems to become a reality.

## 1. Introduction

Vital registration - the systematic recording of births and deaths - has both legal and health significance. From a legal perspective, birth registration is important to protect human rights particularly those of children: illegal child labor, trafficking, military recruitment, early marriage and inheritance of parental property by orphans, while death registration is an integral part of maintaining law and order.

From a health perspective, vital registration allows the measurement of trends in the overall health status of a population, enables evaluation of the impact of health related interventions and is a key entry point for health systems strengthening.[1,2] In particular, accurate recording and reporting of vital statistics are public goods that enable

---

* Corresponding author. Tel.: +352 332515; fax: +352 335133.
*E-mail address:* zachariah@internet.lu (R. Zachariah).

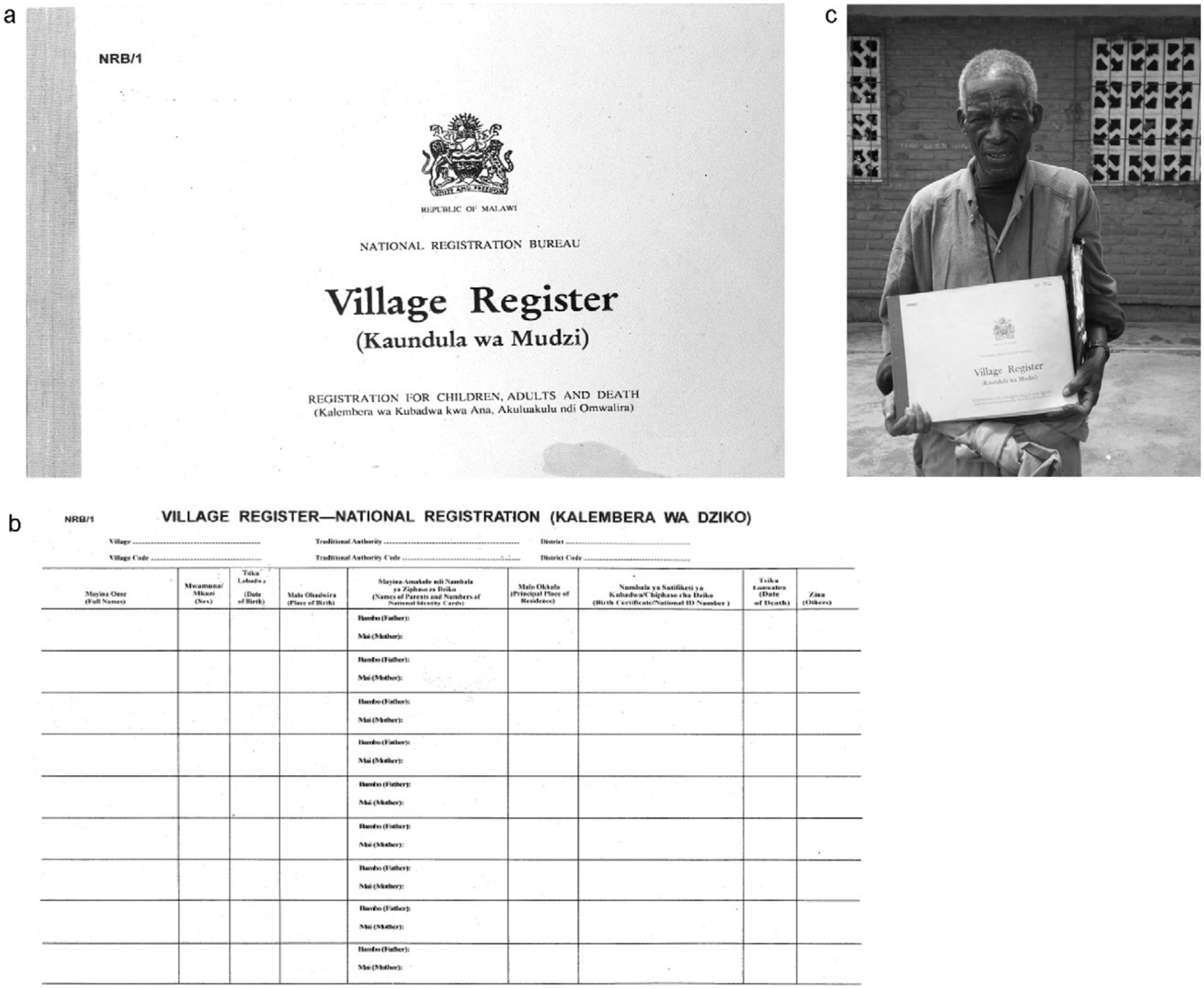
0035-9203/$ – see front matter © 2011 Royal Society of Tropical Medicine and Hygiene. Published by Elsevier Ltd. All rights reserved.
doi:10.1016/j.trstmh.2011.03.002

the monitoring of progress towards achieving the set targets in the 2015 health-related United Nations Millennium Development Goals (MDG).[3] Targets include reducing the under-five child mortality rate by two-thirds (MDG 4), the maternal mortality ratio by three-quarters (MDG 5) and death rates from diseases such as HIV/AIDS, tuberculosis (TB) and malaria.

Despite its importance, most people in Africa are born and die without leaving any trace in any legal record or official statistic.[4] On a global scale, more than one-third of the world's 128 million annual births and two-thirds of its 57 million annual deaths are not registered.[4] Where vital registration exists, this is often limited to health facility based data[4,5] which are not representative as more than half of all deaths that occur in rural African settings do so outside of health facilities.[5,6]

In the absence of a viable vital registration system or reliable mortality statistics from the health information system, vital statistics have been largely dependent on surveys or mathematical models[7] which may differ from reality on the ground.[4,8,9] Finding ways to improve the routine counting and recording of births and deaths is thus of vital public health importance.

In Malawi, a small resource-constrained country in sub-Saharan Africa, there is no enforcement of civil registration laws and reporting of births and deaths is not compulsory. Data on vital registration at national level is thus weak or non-existent. However, a traditional system of informal death reporting through village heads has been practiced for decades. From the context of a rural district in Malawi (Thyolo district), we describe this system and broadly discuss the potential opportunities, challenges and



NRB/1

REPUBLIC OF MALAWI

NATIONAL REGISTRATION BUREAU

Village Register
(Kaundula wa Mudzi)

REGISTRATION FOR CHILDREN, ADULTS AND DEATH
(Kalembera wa Kubadwa kwa Ana, Akuluakulu ndi Omwalira)

NRB/1 VILLAGE REGISTER—NATIONAL REGISTRATION (KALEMBERA WA DZIKO)

Village ........................ Traditional Authority ........................ District ........................
Village Code ........................ Traditional Authority Code ........................ District Code ........................

| Mayina Onse (Full Names) | Mwamuna/ Mkazi (Sex) | Tsiku Lobadwa (Date of Birth) | Malo Obadwira (Place of Birth) | Mayina Amakolo ndi Nambala ya Ziphaso za Dziko (Names of Parents and Numbers of National Identity Cards) | Malo Okhala (Principal Place of Residence) | Nambala ya Satifiketi ya Kubadwa/Chiphaso cha Dziko (Birth Certificate/National ID Number) | Tsiku Lomwalira (Date of Death) | Zina (Others) |
|---|---|---|---|---|---|---|---|---|
| | | | | Bambo (Father):<br>Mai (Mother): | | | | |
| | | | | Bambo (Father):<br>Mai (Mother): | | | | |
| | | | | Bambo (Father):<br>Mai (Mother): | | | | |
| | | | | Bambo (Father):<br>Mai (Mother): | | | | |
| | | | | Bambo (Father):<br>Mai (Mother): | | | | |
| | | | | Bambo (Father):<br>Mai (Mother): | | | | |
| | | | | Bambo (Father):<br>Mai (Mother): | | | | |
| | | | | Bambo (Father):<br>Mai (Mother): | | | | |
| | | | | Bambo (Father):<br>Mai (Mother): | | | | |

**Figure 1.** The traditional village vital registration register, Thyolo district.
1a) Front page of the village register
1b) Page containing vital registration data
1c) A village headman holding his register, Thyolo, District, Malawi

Please cite this article in press as: Zachariah R, et al. Vital registration in rural Africa: is there a way forward to report on health targets of the Millennium Development Goals? *Trans R Soc Trop Med Hyg* (2011), doi:10.1016/j.trstmh.2011.03.002

ways forward in the implementation and interpretation of data for rural settings in Africa.

## 2. Traditional system for recording births and deaths in Thyolo district

Thyolo district is one of the largest rural districts in Malawi with approximately 600 000 inhabitants. The district is divided into 12 administrative areas comprising of 'Traditional Authorities and Sub-Traditional authorities (TA)'. Traditional Authority chiefs and senior representatives of the civil service, including the district health management team, form what is termed the district assembly – the highest decision making authority at district level; a district commissioner heads the district assembly. Each TA comprises several villages with each village having a headman. A group of 6–10 villages report hierarchically to a group village headman who then reports to the chief of the TA. There are a total of 423 village headmen and 65 group village headmen in Thyolo.

Each village headman maintains an improvised register (typically a hard-cover exercise book) for recording deaths and births. In 2007, formal registers were introduced by the national registration bureau through the district assemblies.

Figure 1 (a–c) shows the formal village register and a village headman holding one of these registers. Variables included in this register include: village, traditional authority, district, name, sex, date of birth, place of birth, names of parents, place of residence, birth certificate number and date of death. Reporting on deaths was introduced in Malawi decades ago when this was used with varying success for crossing out the names of adults who died and thus were no longer required to pay tax at village level (Kaundula in the local language). As the registration of adult deaths was linked to village level tax revenue generation, a village headman was sometimes stripped of his title if he did not maintain a good register. Data on deaths are still used by TA to assess household eligibility for aid subsidies (fertilizers, seed grain) and for prevention of property or land grabbing by neighbors and family relatives. In theory, group village headmen in coordination with village heads are accountable to the TA chief for the timely and accurate reporting of deaths. However, in practice, recording and reporting is currently not systematic as the TA does not collate or report on deaths to the district authority.

Figure 2 shows an example of the type and quality of data that were gathered from a village vital register. The fact that over 90% of births in this system occurred at a known health facility implies that the registration of births is incomplete and strongly biased towards births that occurred at health facilities, given that population based surveys estimated that 49% of all births in Thyolo occurred outside of health facilities.[10] Precision on the dates of birth and death as well as cause of death could be improved (Figure 2). Obstacles hindering completeness of data broadly include: lack of enforcement of civil registration law at district level; non-existent collaboration - a complete 'disconnect' - between the health surveillance system and the traditional vital registration systems; the virtual lack of birth and death certificate records that hampers cross-checking of data; absence of routine reporting of

**Village:** Sakoma **Traditional authority:**: Bvumbe **District**:Thyolo

| Total registered (Full names) | Sex[a] filled in No. (%) | Date of birth filled in[b] No. (%) | Place/site of birth filled in[c,d] No. (%) | Name of parents indicated No. (%) | Birth certificate number indicated No. (%) | Total deaths indicated[e] No. | Cause of death indicated[f] No. (%) |
|---|---|---|---|---|---|---|---|
| 846 | 842 (99.5) | 770 (91.0) | 831 (98.2) | 842 (99.5) | 0 (0) | 223 | 24 (10.8) |

[a] Missing data on sex: 4 (0.5%)

**Births**

[b] Date of birth

- Completely missing data on birth: 16/846 (1.9%)
- Day, month and year of birth filled in: 58/846 (6.9%)
- Only year of birth filled in: 712/846 (85%)

[c] Missing data on site/place of birth 15 (1.7%)

[d] Health facility indicated 775 (93%)

**Deaths**

[e] Date of death

- Day, month and year of death filled in: 0/223 (0%)
- Only year of death filled in: 223/223 (100%)

[f] Cause of death indicated (*n*=24): tuberculosis =2, HIV/AIDS = 5, headache/fever= 6, surgery = 2, car accident =1, severe cough = 1, traditional causes = 7

**Figure 2.** An example of the type and quality of data in a village vital register, Thyolo district, Malawi.

Please cite this article in press as: Zachariah R, et al. Vital registration in rural Africa: is there a way forward to report on health targets of the Millennium Development Goals? *Trans R Soc Trop Med Hyg* (2011), doi:10.1016/j.trstmh.2011.03.002

**Table 1**
Main challenges and ways forward in improving district and national level vital registration

| Issue | Challenge(s) | Ways forward |
|---|---|---|
| Political will and awareness | Lack of awareness of the importance of vital registration by government and the public | Conduct workshops and publicity campaigns to highlight responsibilities towards and benefits of birth and death registration; review the registration process to facilitate public participation; develop civil registration information, education and communication directives. |
| | Lack of enforcement of existing legislation | Enforcement of civil registration law. |
| | No agency takes the lead | Designate mandate to an agency or government body to take the lead. |
| | No implementation targets | Set time-bound coverage goals and targets for scaling up vital registration. |
| | Poor interagency collaboration | Establish interagency coordination committees involving the Registrar General's office, Ministry of Health, the National Statistical Office and Ministry of Justice. |
| | High registration fees | Decentralize civil registration and provide certificates free of charge. |
| | Lack of committed resources | Solicit national and international funding. |
| Lack of formal links between civil authority and the HMIS | Lack of formal links between civic authority at decentralized level and health teams. | Designate responsibility on maintaining the vital register at village level, as well as procedures and responsibility for collation, verification, and transmission of data. |
| Essential parameters for the MDGS | MDG parameters often not included in vital registration | Ensure that vital registration systems capture data on key targets of MDG 4, 5 and 6 (Figure 2). |
| | Data management and quality control | Periodic evaluation of data quality according to standard criteria. |
| Establishing dates of birth and death | Missing or incomplete data on birth and death | Source data through households visits, health facilities records, MCH cards, health passports and TBAs as appropriate; use existing (or dedicated) community health workers to gather data at village level; devise a programme to develop human resource capacity. |
| Establish cause of death | Missing or incomplete data on cause of death | Seek medical opinion on the cause of death from community nurses or health facility staff; supplement data on cause of deaths through sentinel sample registration surveys and/or verbal autopsies; conduct operational research to assess feasibility and robustness of verbal autopsies. |

HMIS: Health Management Information System, MDG: Millennium Development Goals, MCH: Maternal and Child Health, TBA: Traditional Birth Assistant.

vital events; lack of training and supervision; and shortfalls in logistical and human resource support.

## 3. Improving vital registration: opportunities, challenges and ways forward

The example of the informal system of death reporting in Thyolo opens a potential opportunity to explore its use for vital registration at a wider level.

Table 1 highlights the main challenges and ways forward in improving vital registration at district and national level in Thyolo and other comparable settings. These are briefly discussed below.

### *3.1. Political will and awareness*

All African countries (except Somalia) have ratified the Convention on the Rights of the Child[11] and have also signed the African Charter on the Rights and Welfare of the Child,[12] both of which require registration of all births. However, depending on where a child is born in Africa, only 24–41% of children have their births registered.[13] Similarly, although death registration is part of national legislation in all African countries, only two African countries (Mauritius and Seychelles) have complete registration of deaths and their causes, and to a certain extent this is fulfilled in South Africa

This gap in practice is due to a number of reasons. First, Governments may not be sufficiently aware of their international obligations to promote vital registration nor of its direct significance for macro planning and national agenda setting. Second, there might be a lack of political will to commit the resources needed especially if birth registration is perceived as minimizing or enhancing the representation of a particular ethnic or religious group. Third, the main actors in the development of civil registration systems – the Registrar General's office, the Ministry of Health and the National Statistical Office – usually work in a parallel manner and may not prioritize the need for developing and implementing civil registration systems. Fourth, even when vital registration systems are available, access may be a problem due to long distances to registration centres and/or the high cost of administration fees for registration. These can act as powerful deterrents.[13]

Finally, individuals themselves might be suspicious of the perceived negative consequences of registration (e.g. possible taxation) or may simply not be aware of the possible benefits of having a birth and death certificate for access to education, child protection, and health. Qualitative studies in this domain are needed to understand the underlying perceptions better, and to ensure that vital registration systems would respect the individual's right to knowledge about how personal information is being used.

### 3.1.1. *Ways forward*

Turning birth and death registration into a routine activity will depend on how well perceived this activity is as a civic and legal responsibility, and as of social value for the individual. The experience from the existing traditional system for reporting births and deaths in Thyolo show that data are entered into the vital register only if there is an incentive or compulsion to do so by the local authorities and/or awareness of its relevance. Policies that require documentation of birth such as for school enrollment may have a more direct effect on the motivation to register such an event. The ideal situation would be one in which all births and deaths are notified to the local authority and individuals receive certificates. To move this forward at a country-wide level, Governments will need to ensure that they enforce civil registration law, set targets for increasing coverage through regional implementation, set time-linked targets to increase birth and death registration levels to specific thresholds, establish a vital statistics act, develop a strategy to ensure the cooperation and coordination of stakeholders at national and international level and devise a program to develop human resources for putting the strategy in place, and for monitoring and data analysis. Finally registration of births and death certificates must be provided free of charge at a decentralized level.[13]

### 3.2. *The lack of formal links at decentralized level between civic authority and the Health Management Information System (HMIS)*

Since vital registration has legal, administrative and health significance, it would seem logical that implementation is a joint responsibility of both civic and health authorities. However, in practice, as is the case in Thyolo, implementation is often a parallel activity with weak links between the two. The practical questions on the ground are: who is legally responsible for the vital register and its contents at village level? Who fills in the data from households? How will the information be recorded, transmitted and stored at district level and who provides feedback, supervision and training?

### 3.2.1. *Ways forward*

The authority that should be held responsible for the village vital register should ideally be the traditional village chief (as is the case in Malawi) or, alternatively, an appointed village head. Responsibility for safe keeping and cross-referencing would also be at this level. Decentralizing responsibility to this level is needed to bestow administrative ownership and responsibility. Gathering information

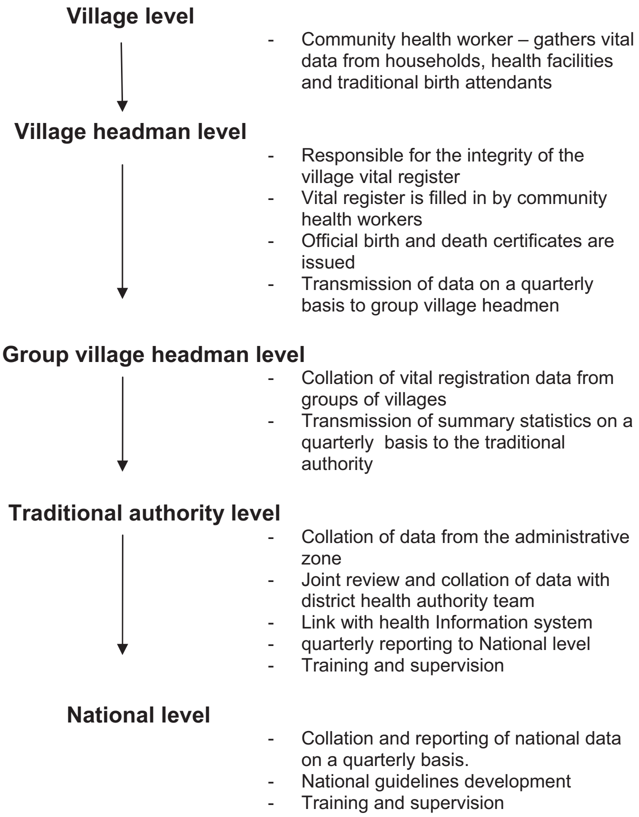


**Figure 3.** An example of information flow at different levels for implementing a village vital registration register, Thyolo, Malawi.

Please cite this article in press as: Zachariah R, et al. Vital registration in rural Africa: is there a way forward to report on health targets of the Millennium Development Goals? *Trans R Soc Trop Med Hyg* (2011), doi:10.1016/j.trstmh.2011.03.002

to fill in the different variables should be the responsibility of dedicated community health workers (CHWs) or similar cadres involved with surveillance activities.[14] Monthly vital register data could then be collated at village level, passed on to group village headmen and then to the central traditional authority. This activity will need standardized registers, standardized and formal reporting forms for data collation, joint coordination, regular support, training, supervision and feedback. Active collaboration between the district health management team and the civic or traditional authority is required to make this a routine monthly or quarterly activity. The results of this exercise can then feed into the HMIS. Figure 3 shows how the link between civic authority and the district health management team/HMIS could possibly function in a setting like Thyolo. There is also a need to think about how to sustain motivation and recognize and reward those who regularly report good quality data.

### *3.3. Focusing on essential parameters needed to monitor progress towards MDG targets*

In settings with limited human and financial capacity, it is essential to ensure that only essential data are collected with a focus on assessing progress towards the MDG targets. Essential variables would include: a clearly (preferably geographically) defined population, up-to-date population size taking account of migrations and dates of birth and death. The number of registered births in a defined time period allows measurement of the crude birth rate at population level which is useful for estimating the number of pregnant women and deliveries, both of which are needed for resource allocation and determining coverage. Deaths would need to be stratified by age and sex to allow the calculation of age- and sex-specific death rates. If exact age is unavailable, indicating whether under five or five years and over is required (under-five mortality rate, MDG 4). Estimation of the maternal mortality ratio (death rate per 100 000 live births, MDG 5) will require complete registration of all births in the reporting area as well as information on pregnancy status of the deceased or whether death occurred within 42 days (6 weeks) post-delivery. Due to the relative rarity of maternal deaths, estimates for maternal mortality are surrounded by wide confidence intervals and large populations (or long time intervals) are required to assess trends in maternal mortality. For the MDG 5, which aims at a 75% reduction in maternal mortality by 2015, this might be over-ambitious within the tight time frame and it might only be feasible to show such differences by 2020. The MDG 6 targets require reporting of death rates from AIDS, TB and malaria.

#### *3.3.1. Ways forward*

Figure 4 shows an adapted version of the Thyolo village vital register with the essential variables needed to monitor progress towards the MDGs 4, 5 and 6. A critical aspect is obtaining reliable, sufficiently up-to-date population denominators for each enumeration area. As a rough and ready approach, we propose to use census extrapolations from the district populations which means that vital events would need to be pooled from all villages in a given district and vital rates could be estimated at the district level. The other option would be that village headmen report on their quarterly or half yearly village population, and that these numbers are aggregated at district level. This might be a more accurate denominator that takes into account immigration and emigration. Experiences from processes employed in Demographic Surveillance Sites (DSS) that have successfully tracked vital events at local level should also be used.[15]

**Village:** **Traditional authority:**: **District**:

| Full name | Sex[a] | Date of birth[b] | Place of birth[c] | Name of parents[d] | Birth certificate No.[e] | Death | | | | Cause of death if known[j] |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Date[f] | Site[g] | Pregnant (Yes/No)[h] | <5 years[i] (Yes/No) | |
| | | | | | | | | | | |

[a] Male or female.
[b] Indicate day, month and year as accurately as possible.
[c] Indicate health facility (name), traditional birth attendant (name and site), or home birth as applicable.
[d] Indicate Fathers and Mothers full names.
[e] Birth certificate number if available.
[f] Indicate day, month and year as accurately as possible.
[g] Indicate if death occurred at a health facility (name), home or other site.
[h] Indicate if the person was pregnant or not.
[i] If exact age is unavailable indicate if the person was estimated to be under 5 years.
[j] Indicate cause of death if available. If patient died of tuberculosis (TB) or on ART, indicate TB or ART clinic registration number.

**Figure 4.** An example of an adapted version of the village register including essential variables needed to monitor the Millennium Development Goals, Thyolo district, Malawi.

Please cite this article in press as: Zachariah R, et al. Vital registration in rural Africa: is there a way forward to report on health targets of the Millennium Development Goals? *Trans R Soc Trop Med Hyg* (2011), doi:10.1016/j.trstmh.2011.03.002

### 3.4. Establishing the dates of birth and death

While the birth of a child is traditionally marked by salutations and expressions of joy, it is often not accompanied by a simultaneous demand for a birth certificate. Even births that occur at health facilities are not routinely accompanied by a formal birth certificate. In Thyolo, 49%[10] of births occur either at home or at lay traditional birth attendant (TBA) sites, and there is no obligation to report this at village level. Similarly, the exact date of death is often not recorded. Deaths of young children are less likely to be ascertained than adult deaths, and neonatal deaths are commonly misclassified as still births, leading to potentially considerable underestimation of under five mortality.[16] In addition, such a misclassification needs to be avoided as it will influence the estimation of the maternal mortality ratio which uses 100 000 'live births' as the denominator.

#### 3.4.1. Ways forward

Sourcing information on dates of birth and death could be improved in a number of ways through CHWs. In most African settings, a birth is celebrated by some form of village festivity; CHWs who reside in these villages can thus easily identify such households. There is the practical issue of women who might move to their parents or parents in law and only return to their home village after several weeks or months. This might make the arrival of a new baby much harder to detect. This needs to be addressed at the village level through community information and awareness and an active link of CHWs at household level. If the specific birth occurred at a health facility, this is generally reported on Maternal and Child Health (MCH) cards or health passports[17] and the information can thus be sourced at household level. Since TBAs reside within the community, it should also be possible to link up with them for deliveries that take place at TBA sites. The latter is vital since close to 50% of all deliveries occur at their sites.[10] Finally, linking vital registration campaigns with national programmes such as routine or mass vaccination campaigns will allow registration of the date of birth directly on a vital register. Additional organization is needed and resources deployed if this is to be effective as staff designated to perform vaccinations typically would be unable to cope with this additional workload.

The recording of deaths has a legal implication and a social value and thus, as in our experience from Thyolo, it is relatively better recorded than births. If information on age or sex is missing, this could be gathered by CHWs through a household visit. Identifying whether a given death occurred at a specific health facility is also important since this will allow the CHW to trace facility based records and to source information on age, sex and, perhaps, the cause of death. This can be done by a physical visit or through direct contact with the health centre using High Frequency (HF) radio, telephones or cell phones, when available.

### 3.5. Establishing the cause of death

The comparability of worldwide causes of death is meant to be facilitated through the development and successive revisions of the international statistical classification of diseases and related health problems (International Classification of Diseases, ICD[18]). The 10th revision was endorsed by the Forty-third World Health Assembly and came into use in WHO Member States in 1994. The classification has its origins in the 1850s when it was termed the International List of Causes of Death.

Despite the existence of the ICD, in more than 90% of African countries no information on cause of death is available for any year after 1990. The main problem lies in the accuracy of diagnosing and reporting causes of death due to a number of reasons. First, although it is necessary that the underlying cause of death be certified by a medical practitioner, a significant proportion of deaths may occur without any medical attention or opinion. Second, post-mortems are not done in most African settings due to lack of capacity and resources.[19,20] Third, legal, societal and other reasons in different settings may result in the underreporting of causes of a sensitive nature or causes associated with stigma such as suicide or HIV/AIDS.[21] Fourth, maternal deaths are generally underreported. For example, maternal deaths involving unsafe abortions are often not disclosed as it will not be revealed that the person was pregnant. It is estimated that 13% of maternal deaths are due to unsafe abortions.[22] Traditional Birth Attendants and families might hide a maternal death in countries where TBAs are no longer legal and women are expected to give birth with a skilled attendant. Finally, in elderly people, with several chronic diseases, it is often problematic to select a single underlying cause of death.

#### 3.5.1. Ways forward

There are a number of ways to try to improve information on the cause of death (albeit with limitations) which are not mutually exclusive. First, if a death occurred in a health facility, the attending clinician or most highly qualified medical person available should be sought to provide an opinion which is then indicated on the patient card or health passport, on a formal death notification form and eventually in the vital register. Implementing the international form of medical certificate of cause of death as recommended by WHO and particularly the use of ICD at health facility level would improve the documentation of cause of death.[18] If the person was pregnant, the cause of death could be sought from the midwife, to determine if the death was due to a direct cause (e.g., ectopic pregnancy, haemorrhage, unsafe abortion, hypertensive disorder, obstructed/prolonged labour, ruptured uterus, sepsis) or an indirect cause (e.g., HIV/AIDS, malaria, meningitis or another disease). This is particularly relevant, for example, in countries with high HIV prevalence where a shift in relative proportions of maternal deaths due to indirect causes (i.e., HIV/AIDS) could occur. Second, if the death occurred at home or in the community, the CHW should seek a medical opinion from the community nurse (where available) or a qualified medical person at the nearest health facility. This information is then entered as the cause of death in the village vital register. However, the validity of such information in terms of sensitivity and specificity is likely to be low.

Please cite this article in press as: Zachariah R, et al. Vital registration in rural Africa: is there a way forward to report on health targets of the Millennium Development Goals? *Trans R Soc Trop Med Hyg* (2011), doi:10.1016/j.trstmh.2011.03.002

Third, since TB care and follow up is generally decentralized to CHWs in most African settings, their reporting can be relatively straight forward. When a patient with TB dies, the CHW normally ensures that this outcome is recorded in the district TB register. The same information and unique TB registration number could be similarly entered into the village vital register. Capturing malaria related deaths could improve considerably with the growing availability and use of rapid malaria diagnostic tests at the village level.[23] In Thyolo, information on cause of death could be gathered from all the above three systems.

In addition more detailed and reliable information on cause of death could be supplemented through sample registration,[24,25] a technique based on a set of surveillance sites, which yields information about levels, patterns and causes of mortality for large populations. This has been done in China, India and Tanzania and might be a cost-effective option for low-income countries. Other options include regular surveys using verbal autopsy reporting[5] or collections of census data. The use of such techniques in a community requires financial support and well-structured procedures to achieve results and this might pose feasibility problems. Operational research to assess feasibility and robustness in the field setting is required.

## 4. An action plan for piloting vital registration

Box 1 highlights a stepwise example of how to possibly implement, sustain and expand vital registration in a rural district like Thyolo.

**Box 1**. An example of a stepwise action plan for piloting vital registration, Thyolo district, Malawi

- Convene a workshop and discussion at the district assembly with the District Commissioner, District health management team, and Traditional authority chiefs on the importance of vital registration. Layout a plan for improving and sustaining vital registration at district level
- Conduct a situational analysis of how many village headman in a district have a vital register, how many fill in the vital register and how complete is this exercise?
- Develop a new village register which includes health related MDG indicators. Produce enough registers for every village headmen.
- Conduct training sessions in each traditional authority about the new village register, its importance and how to fill it in. At these training sessions the new registers are provided.
- Plan and implement a supervision system with quarterly checking of village registers, either done at site or collectively by bringing village headmen together
- Set up computer entry and analysis of data at district level
- Collect quarterly reports from the district assembly monitoring and evaluation unit with NGO or other support.
- Provide feedback to the villages, traditional authorities and the district assembly
- Plan for scaling up to other districts.

MDG: Millennium Development Goals; NGO: Non Governmental Organization

## 5. Discussion

The absence of reliable data on births, deaths and causes of death has been termed a scandal of invisibility which renders most of the world's poor as unseen, unaccountable and hence uncounted.[4] Despite international declarations,[11,12,26] the situation is still one of stagnation[9] with little progress made in our ability to assess country-level progress towards achieving the health related MDGs in 2015. On the level of international support to countries no agency takes the lead.[27] The United Nations (UN) population Fund, although mandated to help countries generate data on population, pays scant attention to civil registration. The United Nations Children's Fund (UNICEF) focuses on birth registration but ignores death registration. The UN Development Programme has a mandate on development and governance but has not linked these with vital registration. The World Bank funding for statistical capacity building has no focus on vital registration. Finally the WHO has produced cause-of-death classifications but has not practically tackled the realities of death certification and coding in countries.[27]

This lack of international will is further blurred by the fact that vital registration systems have also been notoriously difficult to set up and maintain in Africa, particularly in those countries that are hardest hit by the HIV/AIDS epidemic.[4,7–9] Thus, where alternative systems exist, such as the traditional system of vital registration in Malawi, all opportunities to exploit their potential use to report on the MDG targets should be explored. The MDG Africa Steering Group estimated a cost tag for achieving vital registration in Africa of US$80 million or US$0.10 per person.[28] A dime per person is a very reasonable price for a global public good that improves both the impact, and the ability to measure the effect, of the World's investment in health.[26]

In a rural district of Malawi, the traditional system of vital registration might provide an interim solution towards accelerating the production and use of district level vital statistics while waiting for more comprehensive national systems to become a reality.

**Authors' contributions:** RZ and ADH wrote the first draft manuscript and revisions which were critically reviewed by BM, DM, BCM, AB, TG, HC, KB, and AJ. All co-authors contributed significantly to the final version. RZ is guarantor of the paper.

**Acknowledgements:** We are grateful to the traditional chiefs, group and village headmen of Thyolo district for their collaboration and discussions with us. We are particularly grateful to the members of the Thyolo district assembly for their support and collaboration. We thank Dr Olesi Pasulani and Patrick Gomani for helping us pursue administrative issues related to this paper.

**Funding:** None.

**Conflicts of interest:** None declared.

**Ethical approval:** The data presented in this paper is part of what is routinely collected in Thyolo district as part

Please cite this article in press as: Zachariah R, et al. Vital registration in rural Africa: is there a way forward to report on health targets of the Millennium Development Goals? *Trans R Soc Trop Med Hyg* (2011), doi:10.1016/j.trstmh.2011.03.002

of civil registration at the traditional authorities. Formal approval was received from the Thyolo traditional and district authorities who were involved with the paper. The data presented in this paper did not include patient identifiers. The Malawi National Health Science Research Committee provides general oversight and approval for the collection and use of routine programmatic data for monitoring and evaluation, and does not require a formal submission for ethical approval for the type of analysis presented in this paper.

## References

1. G8 Health Experts Group. Toyako Framework for Action on Global Health: report of the G8 Health Experts Group; 2008. http://www.mofa.go.jp/policy/economy/summit/2008/doc/pdf/0708_09_en.pdf [accessed 23 February 2010].
2. Takemi K, Jimba M, Ishii S, Katsuma Y, Nakamura Y. Human security approach for global health. *Lancet* 2008;**372**:13–4.
3. United Nations. Millennium Development Goals. http://www.un.org/millenniumgoals/ [accessed 23 August 2010].
4. Setel PW, Macfarlane SB, Szreter S, Mikkelsen L, Jha P, Stout S, et al. A scandal of invisibility: making everyone count by counting everyone. *Lancet* 2007;**370**:1569–77.
5. Kahn K, Tollman SM, Garenne M, Gear JS. Validation and application of verbal autopsies in a rural area of South Africa. *Trop Med Int Health* 2000;**5**:824–31.
6. Todd J, Balira R, Grosskurth H, Mayaud P, Mosha F, ka-Gina G, et al. HIV-associated adult mortality in a rural Tanzanian population. *AIDS* 1997;**11**:801–7.
7. Stover J, Johnson P, Zaba B, Zwahlen M, Dabis F, Ekpini RE. The Spectrum projection package: improvements in estimating mortality, ART needs, PMTCT impact and uncertainty bounds. *Sex Transm Infect* 2008;**84**(Suppl 1):i24–30.
8. Diaz T, Loth G, Whitworth J, Sutherland D. Surveillance methods to monitor the impact of HIV therapy programmes in resource-constrained countries. *AIDS* 2005;**19**(Suppl 2):S31–7.
9. Mathers CD, Fat DM, Inoue M, Rao C, Lopez AD. Counting the dead and what they died from: an assessment of the global status of cause of death data. *Bull World Health Organ* 2005;**83**:171–7.
10. National Statistical Office (NSO) [Malawi], ORC Macro. Malawi 2004 Demographic and Health Survey. Key findings. 2005. http://www.measuredhs.com/pubs/pdf/SR113/SR113.pdf [accessed 26 January 2010].
11. United Nations. Conventions on the Rights of the Child. New York, 20 November 1989. http://www.hri.org/docs/CRC89.html [accessed 6 January 2010].
12. African Charter on the Rights and Welfare of the Child OAU Doc. CAB/LEG/24.9/49. http://www.africa-union.org/official_documents/Treaties_%20Conventions_%20Protocols/A.%20C.%20ON%20THE%20RIGHT%20AND%20WELF%20OF%20CHILD.pdf [accessed 6 January 2010].
13. Todres J. Birth Registration: an essential first step towards ensuring the rights of all children. *Hum Rights Brief* 2003;**10**:32–5. http://www.wcl.american.edu/hrbrief/10/3birth.cfm [accessed 10 April 2010].
14. Umoyotrust.org. Who we work for. Health Surveillance Assistants (HSAs). http://www.umoyotrust.org/whoweworkfor1.html [accessed 6 January 2010].
15. Hill K, Lopez AD, Shibuya K, Jha P. Interim measures for meeting needs for health sector data: births, deaths, and causes of death. *Lancet* 2007;**370**:1726–35.
16. Nannan N, Timaeus IM, Laubscher R, Bradshaw D. Levels and differentials in childhood mortality in South Africa, 1977–1998. *J Biosoc Sci* 2007;**39**:613–32.
17. Chet N, Chaulagai CM, Jaap K, Humphrey BM, Thokozani C, Ferdinand M. Design and implementation of a health management information system in Malawi: issues, innovations and results. *Health Policy Plan* 2005;**20**:375–84.
18. WHO. Classifications. International Classification of Diseases (ICD). Geneva: World Health Organization; 1992. http://www.who.int/classifications/icd/en/ [accessed 6 January 2010].
19. Ruzicka LT, Lopez AD. The use of cause-of-death statistics for health situation assessment: national and international experiences. *World Health Stat Q* 1990;**43**:249–58.
20. King MB. AIDS on the death certificate: the final stigma. *BMJ* 1989;**298**:734–6.
21. Philips M, Zachariah R, Venis S. Task shifting for antiretroviral treatment delivery in sub-Saharan Africa: not a panacea. *Lancet* 2008;**371**:682–4.
22. Okonofua F. Abortion and maternal mortality in the developing world. *J Obstet Gynaecol Can* 2006;**28**:974–9.
23. Chinnock.P., Malaria diagnosis and treatment must be free if it is to reach all who need it. http://www.tropika.net/svc/news/20081007/Chinnock-20081007-Malaria-diagnosis-treatment-medecins-sans-frontieres [accessed 6 January 2010].
24. Setel PW, Sankoh O, Rao C, Velkoff VA, Mathers C, Gonghuan Y, et al. Sample registration of vital events with verbal autopsy: a renewed commitment to measuring and monitoring vital statistics. *Bull World Health Organ* 2005;**83**:611–7.
25. Baiden F, Bawah A, Biai S, Binka F, Boerma T, Byass P, et al. Setting international standards for verbal autopsy. *Bull World Health Organ* 2007;**85**:570–1.
26. Lee JW. Global health improvement and WHO: shaping the future. *Lancet* 2003;**362**:2083–8.
27. Abouzahr C, Gollogly L, Stevens G. Better data needed: everyone agrees, but no one wants to pay. *Lancet* 2010;**375**:619–21.
28. MDG Africa Steering Group. Achieving the Millennium Development Goals in Africa. June 2008. http://www.mdgafrica.org/pdf/MDG%20Africa%20Steering%20Group%20Recommendations%20-%20English%20-%20HighRes.pdf [accessed 23 February 2010].

Please cite this article in press as: Zachariah R, et al. Vital registration in rural Africa: is there a way forward to report on health targets of the Millennium Development Goals? *Trans R Soc Trop Med Hyg* (2011), doi:10.1016/j.trstmh.2011.03.002