International methodological guidelines for civil registration and vital statistics with emphasis on quality assurance and assessment

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UN methodological framework for evaluating CRVS systems

- **Dimension 1** – Evaluation of quality assurance systems and processes
  - Civil registration structural design
  - Business processes
  - Infrastructure
  - Management and operations
  - Internal audits
  - Overall assessment

- **Dimension 2** - Data quality assessment
  - Accuracy
  - Relevance
  - Comparability
  - Timeliness
  - Accessibility
Models of CRVS structure and design

• **Centralized civil registration system**
  - central agency with national responsibility for directing, coordinating and monitoring the nationwide civil registration and vital statistics systems

  • VIETNAM – Ministry of justice responsible for CR and VS across the country

• **Decentralized civil registration system**
  - Several countries having decentralized systems have made provisions to outline a national model law and its regulations, with provision for each major civil division may promulgate its own laws and regulations according to local situations, but in close conformity with the recommended model

  • E.g INDIA: Registrar General (Ministry of Home Affairs) at central level; but CRVS operationalised at state level by different local ministries (e.g. health/economics and statistics/local administration/education etc), with different models for CR service provision as well as VS data flow
Quality assurance of the legal framework and coordination of CRVS

- Review of legal framework including laws and operational regulations
- Check for definitions of vital events
- Review guidelines to ensure universal coverage
- Ensure the mention of a list of recognized notifiers of vital events
- Assess rules for timelines for registration, delayed registration, penalties
- Identify the specific nomination of institutions / personnel to serve as registrars at local/regional/central level
- Evaluate design of forms/statistical reports/electronic resources against international standards
- Check for guidelines for issuance of registration documents/ certificates/ and submission of statistical returns

- ESTABLISH INTERDEPARTMENTAL COORDINATION COMMITTEE WITH ASSIGNED ROLES AND RESPONSIBILITIES TO MEMBERS
Evaluation of business processes

- develop flow chart of CRVS operations

Fig. 2. Flow chart depicting the structure and organization of the civil registration and vital statistics system in Viet Nam, 2006

Introduction of health sector VA for COD
Business process for CRVS in Punjab state, India

Fig. 1. Organizational flowchart of the civil registration and vital statistics system to report deaths in Punjab, India, 2013

Natural deaths
- Home deaths
  - Not attended by physician
  - Attended by physician
      - Rural areas
          - Primary health sub-centre (local registrar)
      - Urban areas
          - Municipal corporation/council (local registrar)
  - Rural areas
      - Block primary health centre (additional registrar or sub registrar)
  - All areas
      - District hospital (district registrar)
  - State level (chief registrar and additional chief registrar)
- Hospital deaths
      - Government hospital

Unnatural deaths
- Police inquest
    - Foul play
    - No foul play
      - Sent for autopsy
      - Body handed to relatives
  - Registration at local registrar office
• Assess location and distribution of registration points

• Evaluate need for expansion / outreach to improve access and availability of registration services

• Evaluate availability of office space, equipment, stationery

• Availability of human resources, training

• Check uniformity of forms and registration procedures across the country to conform to meet the essential requirements of both CR and VS

• Guidelines for inspection of registration units to review operations, performance and maintenance

• local travel budget for field verification

• etc
Internal audits and overall assessment

- Periodic review of reporting performance and submission of statistical returns
- Special attention to reports on stillbirths, neonatal and infant deaths
- Evaluate data standards
  - Definitions, coding procedures, statistical tabulations, computerization
- Conduct human resources and training needs assessment
- Gauge underlying political will and support (qualitative analysis)
- Plan activities to improve public awareness and participation
- Invite feedback from registration units about workload, specific infrastructure needs or troubleshooting regarding registration of difficult cases (migrants, medicolegal cases etc)
- Prepare annual overall assessment reports at local, regional and national level on the performance of CRVS
Dimension 2 – Data quality assessment

- Accuracy
- Relevance
- Comparability
- Timeliness
- Availability / accessibility

As per Para 576 of the P & R revision 3, 2015
Data accuracy

• **Generalizability** (coverage and completeness)

• **Data quality of individual records**
  – Missing variables, incomplete entries / errors (e.g. sex/age/address etc)

• **Proportions of delayed registration**

• **Data validity** – triangulation with other data sources for the same event or variable, with one source as a reference standard
  – E.g. deaths in CRVS compared with deaths in health records
  – Validity can be measured using indicators such as sensitivity, specificity, and positive/negative predictive values
  Validity can also be evaluated through descriptive analysis of misclassification patterns
### Misclassification patterns: hospital deaths: Thailand, 2005

<table>
<thead>
<tr>
<th>Causes of death</th>
<th>Medical record diagnoses</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>HIV/AIDS</td>
</tr>
<tr>
<td>Septicaemia</td>
<td>44</td>
</tr>
<tr>
<td>Ill defined</td>
<td>16</td>
</tr>
<tr>
<td>Stroke</td>
<td></td>
</tr>
<tr>
<td>IHD</td>
<td>1</td>
</tr>
<tr>
<td>Pneumonia</td>
<td>40</td>
</tr>
<tr>
<td>All other external causes</td>
<td></td>
</tr>
<tr>
<td>Genitourinary diseases</td>
<td>1</td>
</tr>
<tr>
<td>Lung cancer</td>
<td>1</td>
</tr>
<tr>
<td>Road traffic accidents</td>
<td></td>
</tr>
<tr>
<td>Liver diseases</td>
<td>2</td>
</tr>
<tr>
<td>HIV/AIDS</td>
<td>79</td>
</tr>
<tr>
<td>Other malignant neoplasms</td>
<td>1</td>
</tr>
<tr>
<td>COPD</td>
<td>1</td>
</tr>
<tr>
<td>VR diagnosis</td>
<td>TB</td>
</tr>
<tr>
<td>--------------</td>
<td>----</td>
</tr>
<tr>
<td>TB</td>
<td>29</td>
</tr>
<tr>
<td>Septicaemia</td>
<td>8</td>
</tr>
<tr>
<td>Oth inf dis</td>
<td>1</td>
</tr>
<tr>
<td>Other cancers</td>
<td>1</td>
</tr>
<tr>
<td>Diabetes</td>
<td>1</td>
</tr>
<tr>
<td>Isch heart dis</td>
<td>1</td>
</tr>
<tr>
<td>Other/ill def heart dis</td>
<td>4</td>
</tr>
<tr>
<td>Stroke</td>
<td>2</td>
</tr>
<tr>
<td>Pneumonia</td>
<td>13</td>
</tr>
<tr>
<td>Oth/ill def resp dis</td>
<td>4</td>
</tr>
<tr>
<td>Renal diseases</td>
<td>4</td>
</tr>
<tr>
<td>Ill defined diseases</td>
<td>1</td>
</tr>
<tr>
<td>Other/ill def injuries</td>
<td>1</td>
</tr>
<tr>
<td>All others</td>
<td>10</td>
</tr>
<tr>
<td>Grand Total</td>
<td>77</td>
</tr>
</tbody>
</table>

If hospital underlying causes accurate, then numbers would be concentrated along diagonal line.

Net under-reporting in VR – Stroke, diabetes, COPD, TB, AIDS, road traffic injuries.

Issues with design and process of medical certification of cause of death in hospitals.
### Table 4 Misclassification matrix for communicable and non-communicable diseases, urban China, 2002

<table>
<thead>
<tr>
<th>Registration diagnoses</th>
<th>Medical records diagnoses</th>
<th>Total registration deaths</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Cerebrovascular diseases</td>
<td>IHD</td>
</tr>
<tr>
<td>Cerebrovascular diseases</td>
<td>422</td>
<td>12</td>
</tr>
<tr>
<td>Ischaemic heart disease</td>
<td>13</td>
<td>195</td>
</tr>
<tr>
<td>Rheumatic heart disease</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Hypertensive diseases</td>
<td>5</td>
<td>3</td>
</tr>
<tr>
<td>Other heart diseases</td>
<td>4</td>
<td>8</td>
</tr>
<tr>
<td>COPD</td>
<td>7</td>
<td>9</td>
</tr>
<tr>
<td>Pneumonia</td>
<td>10</td>
<td>15</td>
</tr>
<tr>
<td>Other respiratory diseases</td>
<td>8</td>
<td>6</td>
</tr>
<tr>
<td>Nervous system diseases</td>
<td>8</td>
<td>3</td>
</tr>
<tr>
<td>Diabetes Mellitus</td>
<td>17</td>
<td>13</td>
</tr>
<tr>
<td>Genitourinary diseases</td>
<td>6</td>
<td>5</td>
</tr>
<tr>
<td>Viral hepatitis</td>
<td>72</td>
<td>8</td>
</tr>
<tr>
<td>Gastric and duodenal ulcer</td>
<td>1</td>
<td>11</td>
</tr>
<tr>
<td>Diseases of the liver</td>
<td>38</td>
<td>1</td>
</tr>
<tr>
<td>Other digestive diseases</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>All other diseases</td>
<td>13</td>
<td>8</td>
</tr>
<tr>
<td><strong>Total Medical Records deaths</strong></td>
<td>517</td>
<td>281</td>
</tr>
</tbody>
</table>

Values in bold indicate matched cases in the cross tabulation for each diagnoses from the two sources.

- **a** 126-151.
- **b** J00-J06, J30-J39, J60-J69.
- **c** K00-K22, K28-K66, K80-K92.
Other dimensions of validity in regard to causes of death

• Proportion of deaths assigned unknown or ill-defined causes (should be <10%)

• Incidence of misclassification of causes with clear-age sex dependency (should be zero)

• Plausibility of age-patterns of mortality by cause
Reliability / comparability

- **Data reliability** – comparison with another source to measure agreement (when neither source can be used as a reference standard)
  - Often used in the context of interviews (e.g. verbal autopsies) to measure repeatability of responses or inter-rater agreement on causes of death
  - Agreement measured using concordance or kappa statistics

- **Data comparability to establish**
  - Epidemiological consistency – between levels of mortality and cause of death patterns
  - Temporal consistency – trends in cause-specific mortality over time should be relatively smooth, with any spikes/troughs raising the possibility of potential problems with data quality, unless there is a genuine epidemiological reason
Consistency of cause specific mortality over time

Change due to revised ICD coding rules for diabetes
Relevance / timeliness

- Small area statistics for local health policy and planning

- Relevance to assess population dynamics and distribution for general services (housing, education etc)

- Local data is relevant as compared to modelled estimates

- Timeliness margin up to 1 to 1.5 years from reference year for data to be relevant
Accessibility

• Data should meet the users needs in terms of being easily accessible through reports / electronic files

• Citizens should be able to easily access their relevant registration documents/certificates

• There should be availability of anonymized microdata for research