DRCO NANORO

Certification of medical causes of death by verbal autopsy in rural Burkina Faso : a comparative approach between physicians and algorithms through the easyVA platform

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Background

- **Causes of death** → Basic information in epidemiology [Rampatige R, Rodney A, Power M. 2013]
- WHO (2015) : **>** 50% of the 56 million of deaths recorded without medical causes
- Lack of information : Low and Middle Income countries (LMIC)

  → Sub-saharian Africa and Southern Asia
- LMICs : Information mainly from the health facilities (HF) [URCN/HDSS 2013]

→ More than 70% of deaths occur out of the HF

Background

- WHO solution = **Verbal autopsy** (VA) [WHO, VA standards 2009]
- Collaboration Institue For disease Modeling (IDM) and Clinical Research Unit of Nanoro **(CRUN)** : **easyVA**
- 02 ways of diagnosis on **easyVA** : Medical doctors and algorithms (InterVA, InsilicoVA, SmartVA)
- Degree of concordance between both methods not yet established

Research objectives

Study the methods of medical causes of death certification in the Nanoro's health district in BF between January 2014 and November 2016

1. Describe the distribution of causes of death in the HDSS of Nanoro
2. Compare the algorithm InterVA, for the certification of medical causes of death, to the methods of medical doctors
3. Determine the level of concordance between the algorithm InsilicoVA and the doctor's method in the attribution of medical causes of death

Study Design and Methods

- **Area**

  Rural BF, CRUN, Nanoro's HDSS

- **Type and period**

  - Cross-sectional study
  - 35 months : January 2014 to November 2016

- **Population**

  Deaths occured in the Nanoro's HDSS

Study Design and Methods

- **Inclusion criteria** : All the deaths for which
  - VA done
  - Data loaded on the easyVA plateform
- **Data collection** : Interviews with WHO 2014 VA standard questionnaires (French, local languages)
- **Data entry :** ODK collect V1.14.1
- **Medical causes of death certification platform :** easyVA
- **Data analysis :** Stata V14.2

Study Design and Methods

- **Data analysis**
  - **For comparison** : WHO 2016 VA list of COD
  - **Population-level concordance** = **cause-specific mortality fraction (CSMF) accuracy** (Leitao & al., 2014; Murray & al., 2014)
  - **CSMF** : overall performance of an algorithm for predicting the cause of death (COD) distributions across all causes.
  - $CSMF\ Accuracy = 1 - \frac{\sum_{j=1}^{k}\left(CSMF_j^{true} - CSMF_j^{pred}\right)}{2\ (1 - Minimum\left(CSMF_j^{true}\right))}$
  - The closer the value is to 1, the more accurate the predictions.

Results

1424 VAs read by MD, InterVA and InsilicoVA

❑ Male	738 (51.8%)
❑ Female	686 (48.2%)
❑ Mean age at death	50.9 years ; (0 to 106 years)
❑ ≥ 65 years	666 (46.8%)
❑ < 5 years	248 deaths (17.4%)

Results

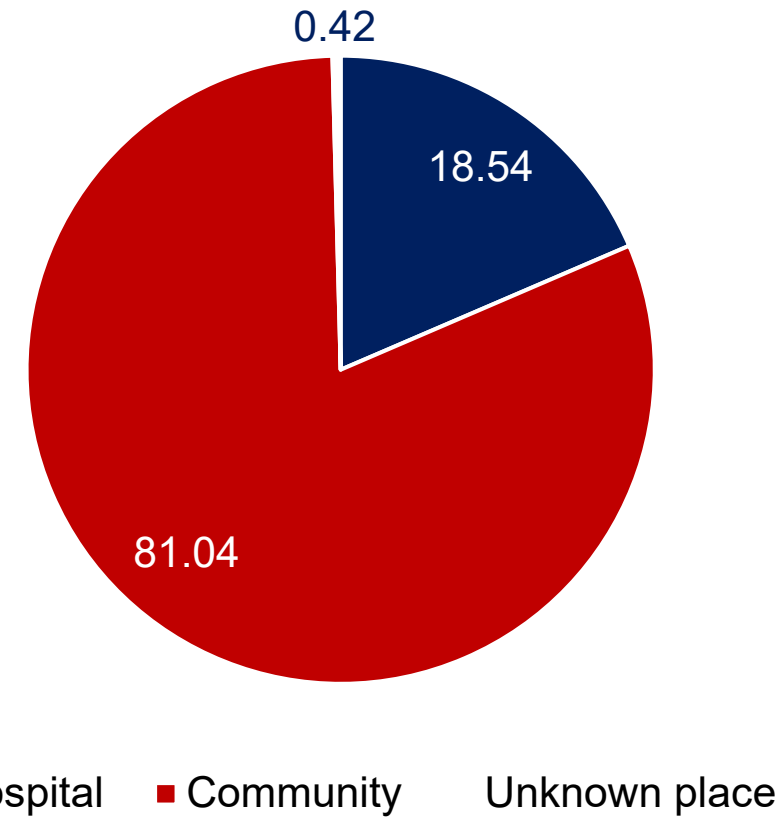


Figure 1 : Distribution of deaths by place of death, N=1424

Results

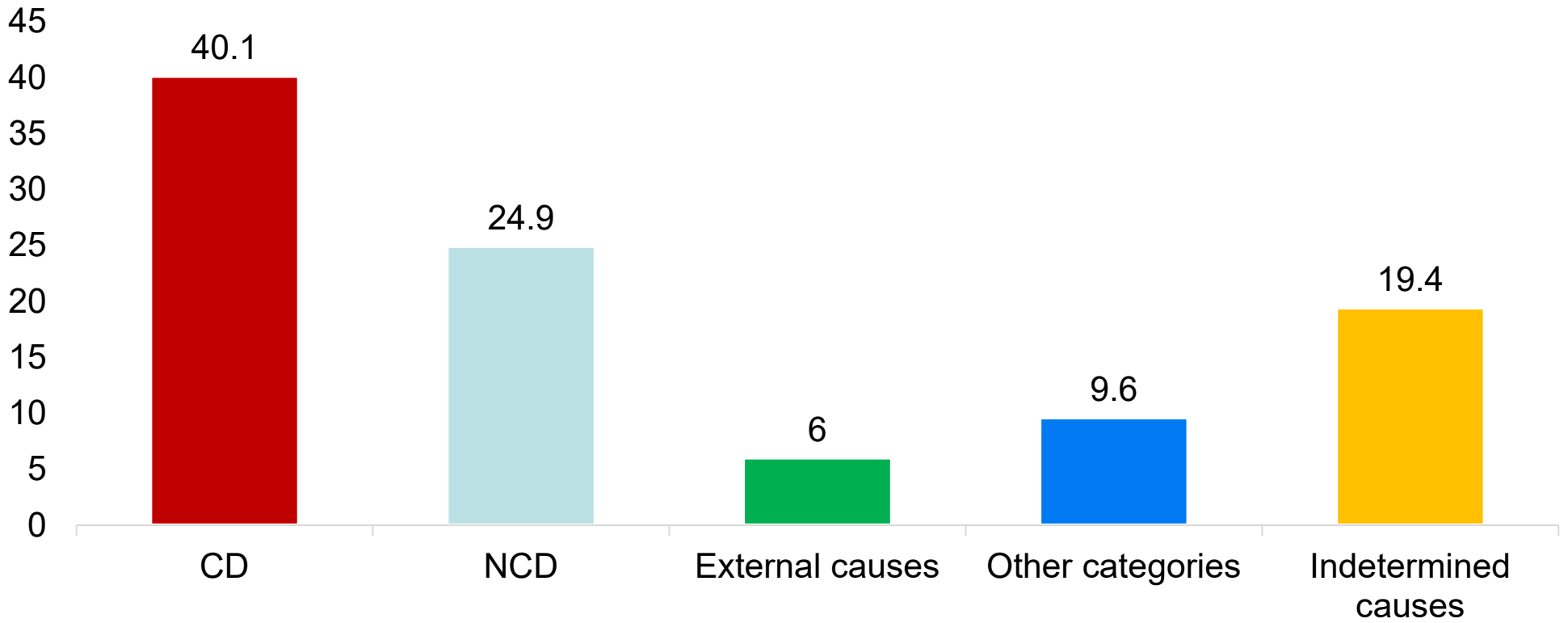


Figure 2 : Distribution of causes of death by category according to PCVA, N=1424

Results

Table I : Distribution of principal communicable diseases according to PCVA

Initial causes of death	Number of deaths	Percentage (%)
Malaria	193	33.8
Diarrhoeal diseases	105	18.4
Acute respiratory infections	104	18.2
Pulmonary tuberculosis	37	6.5
HIV	19	3.3
Sepsis	19	3.3
Meningitis and encepalitis	16	2.8
Other CD	78	13.7
TOTAL	571	100

Results

Table II : Distribution of principal non-communicable diseases according to PCVA

Initial causes of death	Number of deaths	Percentage (%)
Cardiovascular diseases	110	31.0
Digestive diseases	91	25.6
Malignant neoplasms	30	8.5
Chronic respiratory diseases	28	7.9
Renal failure	25	7.0
Nervous system diseases	25	7.0
Nutritional and endocrine disorders	13	3.7
Other CD	33	9.3
TOTAL	355	100

Results

Table III : Distribution of principal external causes of death according to PCVA

Initial causes of death	Number of deaths	Percentage (%)
Drownings	18	21.2
Wounds	16	18.8
Road traffic accident	15	17.7
Falls	11	12.9
Suicids	7	8.2
Animals bites envenimations	5	5.9
Assaults	4	4.7
Other external causes	9	10.6
TOTAL	85	100

Results

Table IV : Distribution of principal maternal causes of death according to PCVA

Initial causes of death	Number of death
Anaemia	1
Parasitic and infectious diseases	1
Post-partum haemorrhages	1
Pre-eclampsia	1
Puerperal sepsis	1
Non-specified causes	7
TOTAL	12

Results

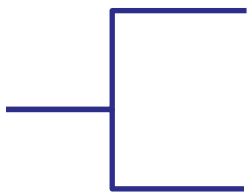
Table V : Distribution of neonatal deaths according to PCVA

Initial causes of death	Number of death
Neonatal infections	17
Congenital malformations	7
Prematurity	2
Newborn respiratory distress	1
TOTAL	27

Results

- **08/10 identical causes of death determined by the** 03 methods

Concordances



InterVA-PCVA = **66.3%**

InsilicoVA-PCVA = **51.8%**

≈ **Ramroth and al.** (BF, 2012) = 625% (InterVA-PCVA)

≈ ***Jha and al.*** (India, 2019) = 45 et 79% (InsilicoVA-PCVA)

Conclusions

- **VA** : Insight into the diseases that weigh most heavily on a community
- **CD** = leading COD with malaria at the top of the list
- **NCD**-related deaths was also high
- **EasyVA** makes it easy to read VAs
- **InterVA and InsilicoVA** should be used in addition to the PCVA
- Assess **SmartVA**

THANKS