

1 Baseline Data on Trend of Maternal Mortality in Tanzania using 2 Administrative Data and its Policy Implication. 2018 Report

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8 Abstract

9 Background: Globally, Civil Registration, and Vital Statistics is the recommended method to
10 track births and deaths. This system is weak in developing countries, including Tanzania.
11 Other systems that may be used to report deaths, especially maternal mortality include
12 integrated Disease Surveillance and Response (IDSR) and DHIS 2. Tanzania has been using
13 Demographic and Health Survey to track maternal deaths from as early as 2000. This study
14 uses a sisterhood method which is conducted every five years, tracking events of the past ten
15 years. It collects maternal deaths related from sisters of the same mother from sampled 10,000
16 households out of 11,000,000 available in Tanzania. The methodology uses wide confidence
17 intervals, which affect its reliability. Therefore, the presented data is the outcome of tracking
18 maternal deaths data using routine system from health facilities and communities in Tanzania
19 Mainland.

21 *Index terms*—

22 *Methodology:* Data collected were from all regions, all health facilities, and communities in Tanzania Mainland
23 using National Governance structures on a daily basis. No funds were used to collect data except for airtime to
24 make calls and internet connectivity.

25 *Results:* A total of 1,744 maternal deaths were mapped from health facilities and community. This number was
26 adjusted for abortion 5%, ectopic pregnancy 5%, community deaths 10%, and unreported 5%. The final adjusted
27 number of maternal deaths was 2,138. Through a regional comparison of maternal deaths with population
28 density, regional variation was critically noted. The data showed that 70% of maternal deaths were caused by
29 PPH (29%), Eclampsia (18.9%), Anemia (8.8%), puerperal sepsis (7.9%), and suspected venous thromboembolism
30 (5.5%). Anesthetic complication contributed to 3.3% of all maternal deaths. *Conclusion:* Tanzania's health sector
31 is mature enough to use routine data on maternal deaths to inform policy. However, a comprehensive, rigorous
32 study needs to be conducted in Tanzania to come up with a better methodology of estimating maternal mortality
33 ratio using routine data.

34 1 I.

35 Literature Review he Millennium Development Goals (MDGs) launched in 2000 required all United Nations
36 member states to be committed to increase investments to improve the life of people worldwide. Goal number
37 5 was among the goals that needed member states to reduce the magnitude of maternal mortality by 75%.
38 Tanzania is one of the members in the global community; she committed herself to meet the goal above by
39 reducing maternal mortality ratio to 193 deaths per 100,000 live births by 2015. To monitor progress, the DHS
40 study was conducted in 2005, 2010, and 2015, and these showed that maternal mortality ratio was 578 per 100,000
41 live births, 454 per 100,000 live births, and 556 per 100,000 live births, respectively (1,2,3).

42 Tanzania, in the last two decades, has invested heavily in socioeconomic development, especially in health, by
43 increasing modern contraceptive use among women of reproductive age from 7% (1990) to 32% (2016) and 38%
44 (2019). Furthermore, there was an increase in the health work force to almost 52% (2018), and EmONC services

3 RATIONALE

45 availability was 32% in 2015. TDHS 2016 report shows that the proportion of women attending the fourth
46 antenatal clinic was 51%, delivery conducted by skilled birth attendants was 64%, and RMNCAH scorecard
47 (January-March 2019) showed that postpartum attendance was 78% (3,4). Furthermore, Tanzania enjoyed,
48 an increase in political commitment for health shown by Tanzania becoming a co-chair of UN commission on
49 Information and accountability for women and children (2010/2011), launch of Tanzania Sharpened One Plan
50 (2014-2015) and a significant increase in resource allocation in health systems that commenced from 2016 by the
51 new Government led by His Excellency Dr. John Pombe Joseph Magufuli, the 5th President of United Republic
52 of Tanzania (5,6). The Lancet countdown report to 2015 observed that although Tanzania between 1990 -2015
53 doubled the population and total budget allocated to the health sector, and increased three-times donor funding
54 for child health and HIV/AIDS interventions, these T increments did not correlate with decline in maternal and
55 newborn deaths (7).

56 From 1990, Tanzania has been tracking data on maternal process indicators and outcome by relying on surveys,
57 demographic and health surveys (DHS), and population census. The DHS developed in late 1980 use sisterhood
58 methodology whose questions targets adult sisters from the same mother enquiring about the outcome of fertility
59 history of female siblings. The method is highly limited due to the use of a small sample size aiming at reducing
60 cost. For example, DHS conducted in Tanzania 10,000 households out of 11,000,000 households have been
61 traditionally being selected.

62 Understanding its limitation, WHO recommends using this methodology for a population with a high fertility
63 rate as it is insensitive to capture maternal deaths when Total Fertility Rate (TFR) is below 3 (8). The major
64 disadvantage of this methodology is because the result emanating from the sisterhood method relates to a point
65 around 10-12 years. As a result the method cannot provide a current estimates for the year of the survey hence
66 making it neither useful to monitor changes in maternal mortality nor to assess the impact of safe motherhood
67 programs in the short term (3). Mgawadere, et al. (2017) echoed the guidance by WHO by showing that
68 Population or household surveys may be critically important to inform the situation on maternal mortality in
69 countries where routine information systems are weak or non-existent (9).

70 2 II.

71 3 Rationale

72 Tanzania has been investing heavily with high political commitment stewardship in improving health, especially
73 RMNCAH services in areas of family planning, skilled birth attendants, EmONC services, and provision of
74 enabling environment. There has been a big appreciable improvement in service delivery, as shown by an increase
75 in users of modern contraceptive services, ANC-4 attendees, delivery conducted in the health facility and skilled
76 birth attendant, and proportion of women receiving postpartum care (1,2,3).

77 Improvement in the Tanzania transport system has a significant contribution in reducing the second level delay
78 of access to receive health care services. The availability of good roads and means of transport facilities is critical
79 in achieving this goal. Tanzania Road Authority (TANROADS) in 2018 reported that 67.2% (8,211 KM) of the
80 roads in Tanzania are paved with almost all regions and the majority of districts connected to this network hence
81 compressing the catchment population between these roads (10).

82 Significant development has also been made in improving available means of transport that range from vehicles,
83 good buses, and motorcycles. The increase in the motorcycle population in East Africa, so as Tanzania, has made
84 a noticeable difference in the transport of critically ill patients, pregnant women during labor and complications
85 by reducing the time taken, from the hard to reach areas to a service delivery point of care. Chen et al. (2017)
86 in Kigoma region showed that motorcycles have made a big difference towards the improvement of access of
87 EmONC health facilities. The report showed that 13% of live births took place in areas where women were able
88 to access health facilities within 2 hours on foot and 33% in areas where motorized vehicles, including motorcycle,
89 were needed to reach the EmONC health facility within 2 hours (11). Save the Children in Kenya (2016) showed
90 testimony from women and community that motorcycles were beneficial in making sure women in need reached
91 in time to a nearby EmONC health facility just in time receive life-saving services for themselves and that of the
92 newborn (12). Schmitz et al. (2019) in Uganda demonstrated that the proportion of women of reproductive age
93 accessing care within 2 hours from 2016 by motorcycles took an upward trend for a facility that provides any
94 EmONC services and comprehensive EmONC services from 61% to 72%, and 51% to 70%, respectively (13).

95 Literacy is a key in gender dynamics towards having liberty in deciding where to seek care, that determine
96 survival and well-being along a continuum of women cycle from pre-pregnancy, antenatal, labor and delivery, and
97 postnatal care. Tanzania 2019 report by UNESCO showed that there is an increase in literacy among girls aged
98 15-24 years from 78% in 1990 to 85% in 2015, making more girls accessing more information to meet their need
99 in sexual reproductive health (14).

100 From 2015 the health sector has been following up the maternal outcome data using routine data. The language
101 at the national and global levels on the number of MD has always been higher at around 11,000 deaths per year
102 as reported by TDHS 2016. These numbers contradicted those reported by regions, which stands at lower (3). In
103 essence, the situation was like the national and global levels were forcing regions to accept the numbers, which
104 are imposed on them. For this reason, the Government of Tanzania, in 2018, undertook a decision to increase

105 stewardship to follow up MD using MPDSR guideline by using national governance structure after understanding
106 that the use of CVR, DHIS2, and IDSR was very low (15).

107 Therefore this baseline report aimed to use available routine data to: 1. Assess and ascertain the real-time
108 situation of MD in Tanzania using administrative data.

109 4 Methodology

110 This report describes the process of counting MD in Tanzania conducted in January -December 2018 in line with
111 Every Woman Every Child Initiative.

112 Using a strong Governance structure available in Tanzania, MD data collected were from all health facilities,
113 communities, districts, and regions.

114 5 a) Setting the ground for data collection

115 In 2015 the National MPDSR Guideline was ratified to be used in Tanzania Mainland in line with WHO and FIGO
116 recommendations. The following year (2016), the Guideline was disseminated to Regional Health Management
117 Teams (RHMTs), Council Health Management Teams (CHMTs), and Health Facilities Management Teams
118 (HFMTs) of all the 26 regions. The Guideline requires notification for every maternal death that has occurred
119 from the health facility and community settings within 48 hours. It also directs to the review of MD within
120 seven days by the health facility maternal death review committee. Furthermore, the committee is required to
121 regularly convene after every notified maternal death or after the occurrence of a near-miss case or monthly when
122 there is no reported maternal death (15).

123 Similarly, the Guideline directs the formation of a district council, which meets monthly and regional MD
124 review committee, meeting after every three months. The Ministry responsible for Health further appointed a
125 National Technical Committee for Maternal Death Reviews, which is supposed to meet bi-annual to receive and
126 discuss MD regional reports, make analysis, provide recommendations and sometimes effect change in various
127 guidelines in practice based on recommendations (15).

128 Aligning to WHO guidance through a 2004 guideline (Beyond the numbers), the process of maternal death
129 review follows a principle of strict confidentiality that information emanating at each level should not leak to
130 outsiders, and all information used and collected should be kept under lock and key. Confidentiality leads to
131 openness in describing causes and factors leading to adverse maternal outcomes. The guideline goes further to
132 emphasize that the process should be anonymous, done under a non-threatening environment, and never the
133 review process should be means of apportioning blame or provide a basis for litigation or management sanctions
134 (15,16).

135 In 2018, the Ministry urged local data experts to discuss a possibility of using routine data to inform estimation
136 of maternal and U5 deaths. Experts noted that in Tanzania, Civil Registration and Vital Statistics (CRVS),
137 DHIS-2 and Integrated Disease Surveillance System (IDSR) were not strong enough to track maternal and under-
138 five deaths. Also, experts acknowledge that Tanzania has a solid governance structure that may be improvised
139 and used to record/track health facility and community MD. Likewise, both health facilities and community
140 were observed to have parallel systems and tracking tools for all deaths. The expert review further identified
141 that Urassa et al. (1994) a study from Muhimbili University of Health and Allied Sciences (MUHAS), showed
142 that only 10% of all MD, reported in Ilala district, occurred in community setting and the rest were from within
143 health system (17).

144 IV.

145 6 Data Collectors

146 Zonal, Regional and District Reproductive and Child Health Coordinators (RCHco) were the strategic officers
147 responsible for January -December 2018 maternal death data collection. The data collection was in line with the
148 National MPDSR Guidelines. The District RCHCos were directly involved in MD notification, reviews, and data
149 collection from health facilities that include dispensaries, health centers, and hospitals, and community within
150 the district council. The collected data from the district council were submitted on a weekly basis to Regional
151 and Zonal RCHCos, who finally transmitted it to the National level by using a designated MPDSR email address
152 for only data collection.

153 7 a) Data Collection Tool

154 A standardized maternal death data collection tool was used to collect the following individual variables; reporting
155 region and district, health facility or community, date, age, gravity and parity, and clinical cause of death. This
156 tool captured suspected MD notified and submitted to the Regional Medical Officer whose duty was to approve
157 before submitting to the Ministry of Health at Reproductive and Child Health Section. As per MPDSR Guideline,
158 all reported MD had to be reviewed within 7-days of occurrence and categorized to ICDM 10 classification at
159 health facility supported by district and regional experts (15).

160 Notified data of MDs from regions were consolidated into the Excel spreadsheet, shared, verified, and validated
161 by regions on a monthly, quarterly, and semi-annual basis after the review. The collected maternal death data
162 were disseminated on a weekly basis at the Department of Preventive Services, quarter and semi-annual at

13 A) CALCULATED MATERNAL MORTALITY RATIO

163 MOH management. Final data were disseminated to different levels and various platforms, including scientific
164 conferences, Government, and stakeholders meeting. Through an official letter signed by Permanent Secretary,
165 and the final MD report was submitted officially to the National Bureau of Statistics.

166 8 b) Data quality control

167 To ensure data quality, the District Reproductive and Child Health Coordinator made active surveillance and the
168 follow up of any reported probable-suspected or confirmed maternal death from a health facility or community
169 setting. For reported suspected community maternal death, a team of district Maternal Death Review Team
170 participated in the funeral and later after about a week returned to conduct a verbal autopsy. Furthermore,
171 the Regional team implemented quarterly supportive supervision to hospitals and health centers where they did
172 verification and validation of reported MD.

173 9 c) Controlling the source of error in calculating the total 174 number of MD

175 The maternal death data collected are required to be representative of the actual situation in the Country hence
176 a need for employing some statistical assumption. In Tanzania, the current institution delivery is 80%, and
177 the postnatal visit is around 78% (18). Mgawadere et al. (2017) report noted that to use health facility data
178 to estimate the reliable magnitude of maternal mortality, institution delivery should be more than 85% (9).
179 In approximating total MD using any method, the biggest challenge is to account for ectopic pregnancies and
180 abortions, reported to contribute 5% and 8% of MD, respectively (19,20,21) (Box 1).

181 10 Box 1: Assumption of possible missed MD (MD)

182 Box 2: Adjusted MD

183 11 d) Evaluation strategy

184 In this documentation, the intention is to demonstrate the implication of follow up of MD conducted in 2018
185 and an ongoing process in monitoring and evaluation of RMNCAH interventions by measuring the outcome. The
186 presentation of data will base on reporting simple ratios.

187 V.

188 12 Results

189 These data were collected from both health facilities and community, and 639 health facilities provided data on
190 MD. These health facilities were both national referral one national hospital (1), three zonal and 28 regional
191 referral hospital and district hospitals, health centers, and dispensaries. The number provided makes 100%
192 coverage of all health facilities which reported MD in 2018. Also, 3% of reported MD occurred in the community.
193 In this report, all 185 district councils had at least one maternal death; none of the districts had zero MD for
194 the entire year.

195 Generally, the total number of MD was 1,744, with an indication that the majority of MD occurring in the
196 health facilities as only 53 (3%) reported from the community.

197 Using the assumption that the cause of maternal death by ectopic pregnancy is 5%, abortion 8%, unreported
198 5%, and community 10%. Recalculated estimated number of MD was 2,138, a count that is within the earlier
199 expected number of MD that range from 1,500 to as high as 2,500 MD.

200 13 a) Calculated Maternal Mortality Ratio

201 The analysis went further to calculate maternal mortality ratio (MMR) based on the projected number of MD
202 as per regional and national levels. The data showed that the estimated National maternal mortality ratio was
203 104 deaths per 100,000 live births with 11 regions standing above the national average, which are led by Dar Es
204 Salaam with MMR of 221 MD per 100,000 live births and Tabora region had the lowest MMR with 52 deaths
205 per 100,000 live births below the national average.

206 In calculating number of MD following assumption were made: i.

207 Annual counted no. of MD in 2018 (AMD) ii. MD that my occurred in the community 10% (17). iii. MD
208 that were caused by ectopic pregnancy shall be 5% (19). iv. MD that were caused by abortion shall be 8% (20).
209 v. Proportion MD that were unreported just assigned to be 5%.

210 From the assumption above the actual collected maternal deaths were adjusted accordingly.

211 Summary of adjusted no. of MD due to: i.

212 Ectopic pregnancy adjusted from 1% (N=18) to 5%= 90 ii. Abortion adjusted from 2.6% (N=46) to 8%=142
213 iii. Community adjusted from 3% (N=53) to 10%=177 iv. Unreported cases adjusted by 5% from all reported
214 deaths=102 v. Calculated no. live births 2,050,332 Adjusted no. of MD is 2,138, which is the same as 104MD
215 per 100,000 live births Data reported in 2018 on MD provides enormous information regarding where and what
216 caused MD, and this was possible through MD reviews conducted using a National MPDSR guideline at the

217 health facility, district council, regional and national level. Though in Tanzania, the sisterhood method had
218 been the source of estimation of maternal mortality ratio, the methodology consistently lacked to provide critical
219 analysis on the cause and where MD occurred. The 2018 report on maternal mortality showed that 70% of
220 deaths were caused by mainly five major complications, which were Postpartum hemorrhage (29.0%, N=506),
221 Eclampsia related complication (18.9%, N=329), Severe anemia in pregnancy (8.8%, N=154), obstetric sepsis
222 (7.9%, N=139) and suspected venous thromboembolism (5.5%, N=96) and 32% of deaths occurred in referral
223 hospitals, which are regional, zonal and national referral hospitals.

224 14 Discussion

225 Commencing from 2016 -2019 Tanzania took seriously tracking and use of routine maternal, newborn, and child
226 deaths data in programming and measuring progress. The MD registration has been possible by the use of the
227 strong Country Governance Structure that has enabled to track data on Maternal, Newborn, and Child Health
228 outcome from both health facilities and community. Implementation of MPDSR Guidelines has been a useful tool
229 in the notification and classification of MD. As reported in the previous section, data collection was, and continue
230 to be conducted manually from health facilities and community to district council via District Reproductive and
231 Child Health Coordinators, and at Region level by Regional Reproductive and Child Health Coordinators and
232 finally to the Ministry of Health, Community Development, Gender, Elderly and Children at the Reproductive
233 and Child Health Section. This paper negates the prevailing assumption that that the Country health system
234 cannot track the maternal, newborn, and child health outcome data. Waiswa et al. (2019) observed that under-
235 reporting of pregnancies and birth outcomes is a major issue that needs to be addressed (21). In the case of
236 Tanzania, the development, dissemination, and use of MPDSR Guideline has enabled to great extent to mitigate
237 this challenge of under-reporting.

238 This report observed that following the adjustment of data using the assumption, the calculated National
239 MMR was 104 deaths per 100, 000 live births with a regional range of as high as 220 deaths per 100,000 live
240 births for Dar Es Salaam Region to as low as 54 deaths per 100,000 live births for Tabora Region. A CDC report
241 tracking decline maternal mortality in Kigoma in 2018 showed that maternal mortality ratio for the Region was
242 174 deaths per 100,000 live births, twice as much to the magnitude presented in this paper, which is 82 deaths
243 per 100,000 live births. The variation above may be attributed to the methodology used by the later, whose data
244 collection was confined to the health facilities to monitor progress EmONC intervention (22).

245 The report further shows that when the number of MD is compared with a regional population, a different
246 picture is displayed. Katavi population was leading with the bigger weight of MD per population of 8.2 deaths
247 per 100,000 people, followed by the Mtwara region with 5.7 deaths per 100,000 population. The region which
248 had the least weight was Njombe Region, with 1.5 deaths per 100,000 live births.

249 Unlike the sisterhood method, which can provide a country MMR for Global level advocacy, the use of routine
250 data carries more information to inform policy and implementation. This paper demonstrated that the top
251 five leading causes of all 70% of MD were postpartum hemorrhage, eclampsia, anemia, sepsis, and suspected
252 thromboembolism. The observation above tally with that of Mgawadere et al. (2017), which observed that
253 health facility MD data in many developing countries provide valuable information on where and why maternal
254 death occurred hence calling for a need to invest in them (9).

255 15 VII.

256 16 Recommendation

257 Published data demonstrate the value of using health facility data to describe the burden of MD beyond the
258 numbers aligned to Every Woman, Every Child (EWEC) initiative. Finally, it fair to recommend that Tanzania
259 and possibly to other Sub Saharan Countries that the health sector is mature enough to use routine data on
260 maternal deaths to inform policy. However, a comprehensive, rigorous study needs to be conducted to come up
261 with a better methodology of estimate MMR using routine data. ¹

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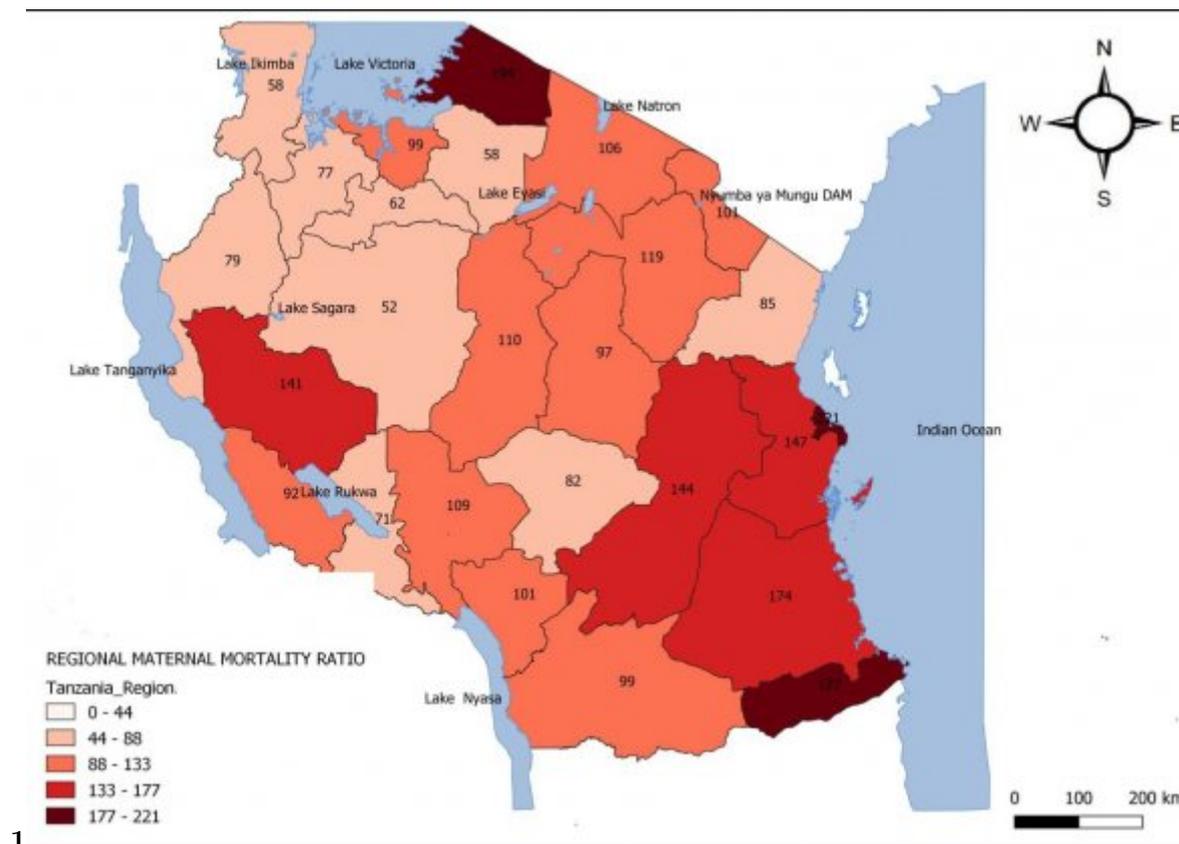


Figure 1: Figure 1 :

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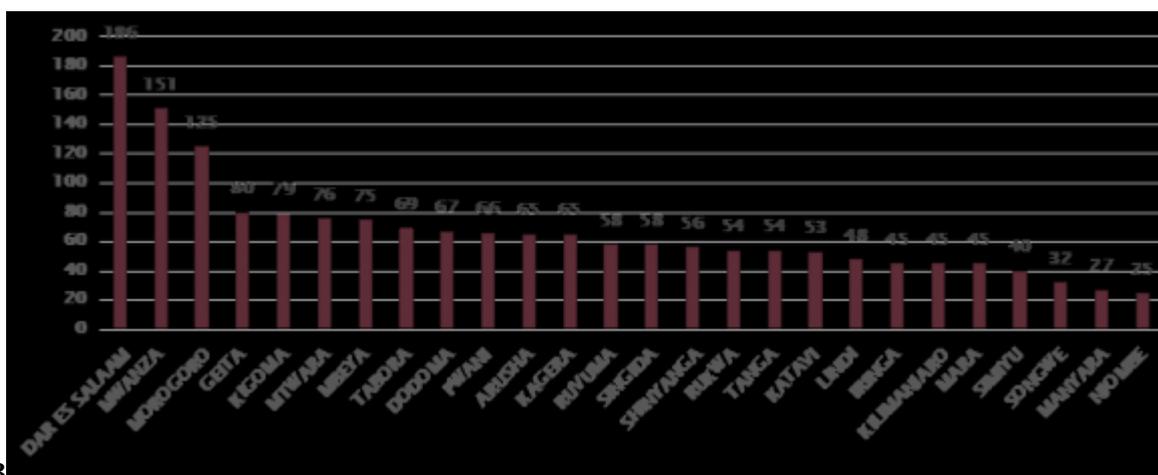
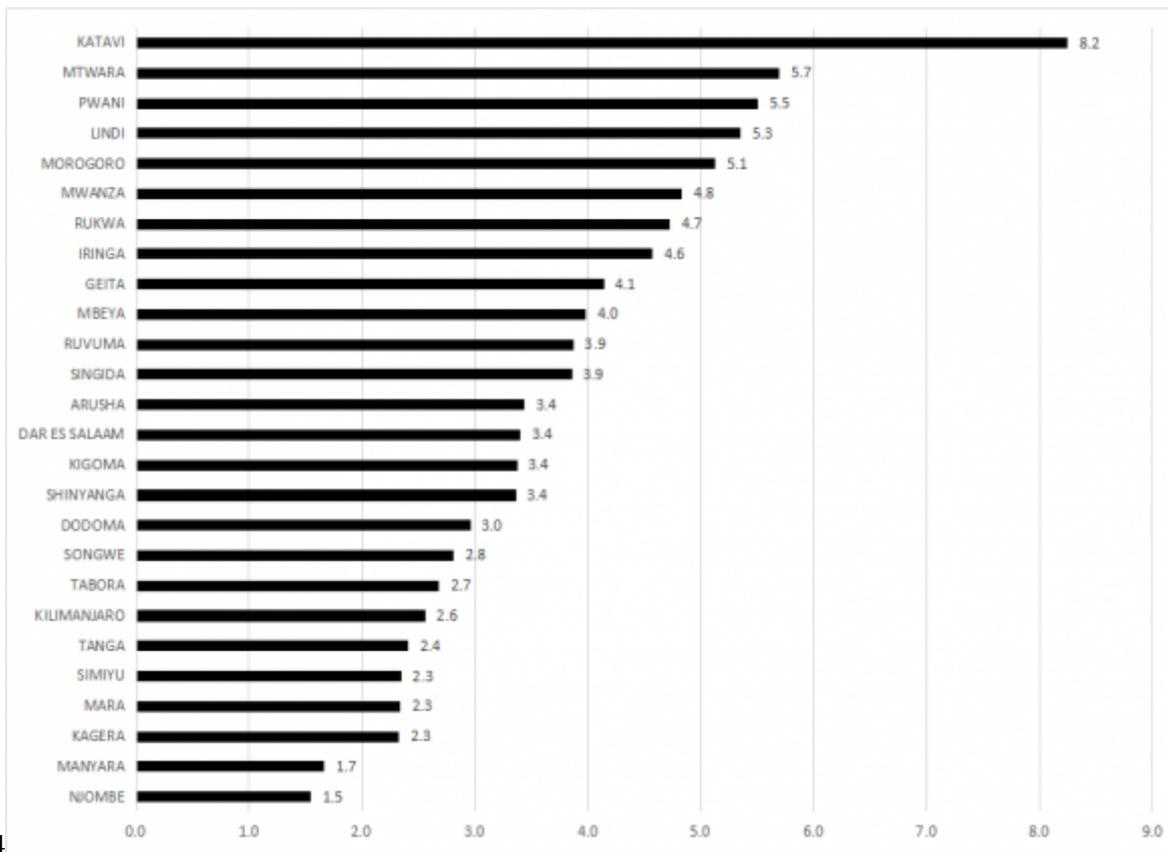


Figure 2: Figure 2 :Figure 3 :

23



4

Figure 3: Figure 4 :

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