Appendix I

**Methods for adjustments of HIV/AIDS mortality**

For this study, 'misclassified' deaths are defined as deaths that were due to AIDS but not reported as such in the death certificates, while 'Under-reported' deaths refers to deaths which were not declared or registered in the civil registries. According to the ICD-10 underlying cause of death selection rules, a death may be considered as HIV/AIDS if there is reference to HIV/AIDS in any line of the death certificate, as well as mention of a condition that is considered a direct consequence of HIV/AIDS. The conditions that are assumed to be direct consequences of HIV/AIDS are Kaposi's sarcoma, Burkitt's tumour, and any other malignant neoplasm of lymphoid, haematopoietic and related tissue, classifiable to C46 or C81–96; and any infectious diseases classifiable to A00–B19, B25–B49, B58–B64, B99 or J12–J18 [26]. To adjust for misclassification, the potential 28 causes of death were investigated using age-specific rates trends plotted over time. AIDS-indicators following the same distinct age pattern typical of HIV/AIDS age-specific death rates trends plotted over time were selected for estimating excess mortality. Statistics South Africa [27] indicated that 96% of completeness of death registration was achieved for the 2015 period. This is significant given that we utilized the 2015 death rate to calculate expected mortality (expected mortality was subtracted from observed mortality) and excess mortality from the causes which were identified as AIDS-indicators. Death records with no information on age were redistributed proportionally to all other age groups for the same year of death while deaths due to ill-defined causes were redistributed across all other natural causes of death. Expected numbers of AIDS deaths that were coded as ill-defined causes were estimated using the proportion of AIDS deaths among all-natural causes of deaths. To adjust for under-reporting, the observed number of AIDS deaths were further adjusted for incompleteness. To do that, the ratio of overall observed death rate from our working data and overall estimated death rate from WHO was subtracted from 1. Furthermore, excess and expected mortality due to ill-defined causes were scaled-up by the proportion of incompleteness.