Health and economic burden of female genital mutilation: an online tool for data visualization

Technical annex: Modelling approach

Overall approach

The economic burden of Female Genital Mutilation (FGM) was modelled on a country-level by estimating the quantity of healthcare resources required to treat and manage complications of FGM, and multiplying these quantities by unit costs ("P*Q model"). The quantity of resources required was estimated by modelling the population evolution over time, considering official United Nations World Population Prospects (2017) population structures, projections and fertility rates (*1*), using a dynamic state-transition Markov model.

Countries

The economic burden of FGM was estimated in countries with a high and known prevalence: Benin, Burkina Faso, Central African Republic, Côte d'Ivoire, Cameroon, Chad, Djibouti, Egypt, Eritrea, Ethiopia, Ghana, Guinea, Gambia, Guinea-Bissau, Iraq, Kenya, Mali, Mauritania, Niger, Nigeria, Soudan, Senegal, Sierra Leone, Somalia, Togo, United Republic of Tanzania, Yemen. Countries where prevalence data were not available by types of FGM were not included in the analysis since it was not possible to accurately model the burden in these countries. Three countries were not included for this reason: Indonesia, Liberia and Uganda.

Prevalence data

The national prevalence of FGM in the adult female population (aged 15-49 years) was taken from the most recently available Demographic and Health Surveys (DHS), or Multiple Indicator Cluster Survey (MICS), which included a special module on FGM.

Model structure

A dynamic Markov state-transition model with a time horizon of 30 years was constructed, including states for different life stages during which different complications of FGM may arise (childhood, adulthood, reproductive adulthood, and later life). The model stratifies the population by different levels of severity based on extent of tissue removed. Type 1 and Type 2 were analysed separately from the most severe form of FGM (Type 3).

Risks of health complications

Risks of health complications associated with the different life stages, and different types of FGM, were sourced from a systematic review and random effects meta-analysis of the published epidemiological evidence to estimate the pooled (inverse variance) absolute difference in risk between FGM and non-FGM groups. Incremental risks of each complication in the FGM groups, as compared with non-exposed women, were rescaled to incremental annual probabilities for the state transition model.

Background mortality

The model population was adjusted annually for background mortality in the child, adult and later life groups, based on the WHO Global Health Observatory indicator LIFE_0000000030, representing the probability of dying between ages x and x+n (*2*).

Intervention effectiveness and scenarios

As the evidence for effectiveness of interventions against FGM is limited, we considered the potential impact of hypothetical interventions on the burden of FGM in two scenarios: Full and partial abandonment of FGM practices. The effectiveness of these hypothetical interventions is defined to be 100% and 50% reduction in incidence, respectively.

Unit costs and consultations

The consumption of commodities (mainly pharmaceuticals and antiseptic solutions) and number of outpatient consultations/inpatient days per intervention required for each health complication was sourced from the WHO OneHealth tool list of interventions (*3*), where available. Unit costs of commodities were sourced from the Management Sciences for Health Drug Price Indicator (*4*), and national costs of outpatient consultations and inpatient days were taken from the WHO CHOICE database (*5*). All costs were expressed in US$ 2018.

Scope of the analysis

The model did not take into consideration the health care utilization and treatment seeking patterns in the study countries. Additionally, the model does not distinguish between sources of financing for the treatment of the complications studied. Consequently, modelled costs could be borne by either the public sector, or by individuals privately (out-of-pocket).

In addition to the increased health risks associated with FGM, this harmful practice can also affect women's lives adversely in numerous ways, many of which are not easily quantifiable through an economic analysis. Evidence from qualitative literature suggests that women's lives are indeed negatively impacted by FGM, but the evidence of its impact on school or employment participation was insufficient to justify inclusion of these social or economic costs in the model. Likewise, the judicial or punitive costs to prosecute those performing or permitting the cutting of girls were not included in the model because of the lack of data on costs related to effective application of laws in the included countries. The analysis is therefore focused exclusively on economic costs related to treatment of health complications associated with FGM.

Peer review and additional information

The model has been internally peer-reviewed, and a full technical paper will be published. Additional technical details on the modelling approach, inputs or other aspects are available on request (see the About page for contact details).