Global, regional, and national levels of maternal mortality, 1990?2015: a systematic analysis for the Global Burden of Disease Study 2015

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Background In transitioning from the Millennium Development Goal to the Sustainable Development Goal era, it is imperative to comprehensively assess progress toward reducing maternal mortality to identify areas of success, remaining challenges, and frame policy discussions. We aimed to quantify maternal mortality throughout the world by underlying cause and age from 1990 to 2015. Methods We estimated maternal mortality at the global, regional, and national levels from 1990 to 2015 for ages 10?54 years by systematically compiling and processing all available data sources from 186 of

195 countries and territories, 11 of which were analysed at the subnational level. We quantified eight underlying causes of maternal death and four timing categories, improving estimation methods since GBD 2013 for adult all-cause mortality, HIV-related maternal mortality, and late maternal death. Secondary analyses then allowed systematic examination of drivers of trends, including the relation between maternal mortality and coverage of specific reproductive health-care services as well as assessment of observed versus expected maternal mortality as a function of Socio-demographic Index (SDI), a summary indicator derived from measures of income per capita, educational attainment, and fertility. Findings Only ten countries achieved MDG 5, but 122 of 195 countries have already met SDG 3.1. Geographical disparities widened between 1990 and 2015 and, in 2015, 24 countries still had a maternal mortality ratio greater than 400. The proportion of all maternal deaths occurring in the bottom two SDI quintiles, where haemorrhage is the dominant cause of maternal death, increased from roughly 68% in 1990 to more than 80% in 2015. The middle SDI quintile improved the most from 1990 to 2015, but also has the most complicated causal profile. Maternal mortality in the highest SDI quintile is mostly due to other direct maternal disorders, indirect maternal disorders, and abortion, ectopic pregnancy, and/or miscarriage. Historical patterns suggest achievement of SDG 3.1 will require 91% coverage of one antenatal care visit, 78% of four antenatal care visits, 81% of in-facility delivery, and 87% of skilled birth attendance. Interpretation Several challenges to improving reproductive health lie ahead in the SDG era. Countries should establish or renew systems for collection and timely dissemination of health data; expand coverage and improve quality of family planning services, including access to contraception and safe abortion to address high adolescent fertility; invest in improving health system capacity, including coverage of routine reproductive health care and of more advanced obstetric care?including EmOC; adapt health systems and data collection systems to monitor and reverse the increase in indirect, other direct, and late maternal deaths, especially in high SDI locations; and examine their own performance with respect to their SDI level, using that information to formulate strategies to improve performance and ensure optimum reproductive health of their population. Funding Bill & Melinda Gates Foundation. ©