Geneva, 2 May 2016. More women in Mexico than previously thought are dying of indirect causes of maternal mortality – such as type 2 diabetes and hypertension – conditions that often predate their pregnancies, according to a study published today.

The study, by authors in Mexico and the United States of America, appears in a special issue of the *Bulletin of the World Health Organization*.

Fewer women in low and middle-income countries die due to conditions related to pregnancy and childbirth than 10 years ago (1). The study highlights the risk that noncommunicable diseases could undermine recent progress in improving maternal survival.

"We are winning the battle against the traditional causes of maternal death – such as post-partum haemmorhage, but not against the indirect causes of maternal death," said co-author Dr Rafael Lozano, from the National Institute of Public Health of Mexico.

Lozano and his colleagues' findings add to mounting evidence on the causes of deaths during pregnancy in Mexico and are consistent with the latest global analyses that more than a quarter of maternal deaths worldwide are due to indirect causes (2).

Maternal death – when a woman dies during pregnancy, childbirth or in the 42 days after she gives birth – is an important measure of a country's level of development and of how well its health system is performing.

Direct maternal deaths result from obstetric complications during pregnancy and childbirth. Indirect maternal deaths result from an often pre-existing disease made worse by pregnancy and include noncommunicable conditions, such as type 2 diabetes and cardiovascular disorders, as well as infectious and parasitic diseases such as HIV infection, tuberculosis, hepatitis, influenza or malaria.

The authors identified and re-classified 1214 deaths as maternal deaths, revealing that such deaths in Mexico had been underestimated by about 13%. As a result, Mexico's maternal mortality figures for the study period were corrected from 7829 to 9043.

The additional maternal deaths were identified using a new method of intentional search and review of maternal deaths and their reclassification, called *Búsqueda Intencionada y Reclasificación de Muertes Maternas*
or BIRMM (5).

Applying the new method to data from the eight-year study period, the authors found that maternal deaths from direct obstetric causes declined from 46.4 to 32.1 per 100 000 live births during the study period and that maternal deaths from indirect causes had remained steady with 12.2 deaths per 100 000 live births in 2006 compared with 13.3 deaths per 100 000 live

births in 2013.

"The direct maternal deaths concern women living in the poorest municipalities, but the women who died of indirect causes had fewer pregnancies, were better educated and tended to live in wealthier municipalities," Lozano said.

Like many middle-income countries Mexico has seen a rapid increase in high levels of cholesterol and obesity in recent years. This puts women of reproductive age at higher risk for pre-existing hypertensive disorders and type 2 diabetes (2).

Seven out 10 Mexicans are overweight, while three of those seven are obese (3). A person with a body mass index (BMI) of 25 or more is considered overweight, and with a BMI of 30 or more is considered obese.

In addition, the age-adjusted prevalence of diabetes in adult Mexicans increased from 10.2% to 10.7% between 2010 and 2014, according to the World Health Organization's (WHO) *Global status report on NCDs*
. In 2014, Mexico had the highest prevalence of diabetes among the Organisation for Economic Cooperation and Development's 34 countries.

The study adds to increasing evidence of the "obstetric transition", a term recently coined to describe the shift in the causes of maternal deaths from direct to indirect.

"Maternal health programmes tend to focus on making skilled birth attendants and emergency obstetric care available, and on what happens at the time of the delivery," said Dr Flavia Bustreo, Assistant Director-General for Family, Women's and Children's Health at the World Health Organization (WHO).

"There has been a huge improvement in the provision of these interventions in low and middle-income countries and this has reduced maternal mortality globally. But the vast majority of maternal deaths from indirect deaths cannot be averted through these delivery-focused interventions," Bustreo said.

"In the absence of the intense review process by the study authors these deaths would not have been counted and the true magnitude of maternal mortality in Mexico would have been underestimated," Bustreo said.

She said it was vital that governments and the international community continue to invest in civil registration systems to ensure that every maternal death is counted and that the correct cause of death is registered in each case. Specialized systems, such as maternal death surveillance and response and confidential enquiries, can provide critical information on the events that led up to a maternal death and identify the improvements that urgently need to be made to prevent future deaths.

The new *Global Strategy for Women's, Children's and Adolescents' Health* (2016-2030) proposes key actions governments can take to end all kinds of preventable maternal mortality,

Bustreo said.

These include: strengthening the health workforce and scaling up efforts to ensure universal coverage of essential health services, including pre-pregnancy detection and management of noncommunicable diseases and their risk factors (e.g. obesity).

The study by Lozano and his colleagues is one of a special collection of articles published in the May issue of the *Bulletin of the World Health Organization* that is devoted to new evidence and key lessons from efforts over the past 15 years to reduce maternal, child and adolescent deaths.

The collection of articles is timely because many countries are just starting to implement the global strategy, which aims to prevent deaths and improve overall health and well-being.

The Mexican study highlights the need for maternal, newborn and child health services to be designed to meet new challenges, such as the emerging threat of noncommunicable diseases to maternal health.

"To reduce indirect maternal deaths, obstetricians and other health-care personnel attending to women during pregnancy and the postpartum period need to be trained to care for women's health holistically and not just her pregnancy," Bustreo said.

"This special issue presents important new findings on actions that countries can take to ensure that women, children and adolescents not only survive, but thrive," she said.

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