

A REPORT OF THE CSIS
GLOBAL HEALTH POLICY CENTER

Improving Maternal Mortality and Other Aspects of Women's Health

THE UNITED STATES' GLOBAL ROLE

Author
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October 2012



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IMPROVING MATERNAL MORTALITY AND OTHER ASPECTS OF WOMEN'S HEALTH THE UNITED STATES' GLOBAL ROLE

*Phillip Nieburg*¹

*Societies that have achieved the lowest levels of maternal mortality have done so by preventing pregnancies, by reducing the incidence of certain [pregnancy] complications, and by having adequate facilities and well-trained staff to treat the complications.*²

Introduction

Over the past several decades, the world has witnessed some astonishing global health success stories—from the eradication of smallpox to the expanding control of other vaccine-preventable diseases to the widespread provision of effective treatment for HIV/AIDS to millions of people. Yet, for all these public health and medical advances, a startling number of women still die each year from causes linked to pregnancy and childbirth: 287,000, according to the most recent consensus estimates.³ That's nearly 800 women per day; more than 30 every hour. Eighty-five percent of these deaths occur in sub-Saharan Africa and South Asia. Many if not most are thought to be avoidable given adequate maternal access to emergency obstetric care (EmOC).

Over the last 25 years, some countries, including some that are resource poor, have made striking progress in reducing maternal mortality, but many others still lag behind and are unlikely to achieve the country-specific 2015 women's health targets established in 2000 under the Millennium Development Goals.⁴

¹ Phillip Nieburg, MD, MPH, is a senior associate with the CSIS Global Health Policy Center. He was accompanied on this mission by Janet Fleischman, also a CSIS senior associate.

² James McCarthy and Deborah Maine, "A Framework for Analyzing the Determinants of Maternal Mortality," *Studies in Family Planning* 23 no.1 (January/February 1992): 23–33.

³ World Health Organization (WHO), *Trends in Maternal Mortality: 1990–2010: WHO, UNICEF, UNFPA, and The World Bank Estimates* (Geneva: WHO, 2012), http://whqlibdoc.who.int/publications/2012/9789241503631_eng.pdf.

⁴ In 2000, the United Nations, concerned about limited progress being made in advancing global reproductive health goals, had included "Improve women's health" as one of eight new Millennium Development Goals (MDGs) intended to address a series of important global development challenges by 2015. Details of these goals—and progress toward them—can be found at <http://www.un.org/millenniumgoals/bkgd.shtml>.

In response to this ongoing tragedy, the United States has recently begun taking an increasingly visible role in global efforts to reduce maternal mortality, seeking to create new governmental and public-private partnerships toward that end. In June 2012, Secretary of State Clinton delivered a major speech in Oslo, Norway, highlighting the huge global burden of maternal mortality, and announcing U.S. participation in a new initiative called Saving Mothers, Giving Life, a five-year endeavor designed to help provide needed emergency care to women in labor, delivery, and the first 24 hours postpartum.^{5, 6} The United States will contribute \$75 million to this public-private collaboration, which will initially focus on maternal mortality challenges in selected districts of two sub-Saharan African countries, Uganda and Zambia. The Saving Mothers, Giving Life collaboration will also be supported by direct and in kind resources from the government of Norway (\$80 million), the Merck for Mothers Program⁷ (\$58 million), the American College of Obstetrics and Gynecology (technical support), and the Every Mother Counts campaign (public outreach).^{8, 9, 10}

In April 2012, before the Saving Mothers, Giving Life program was announced, a small CSIS delegation traveled to Tanzania to explore constructive roles that the U.S. government and other external donors could play in improving women's health and reducing maternal mortality in Tanzania and elsewhere.¹¹ This report on the maternal health aspects of that visit is intended for

⁵ Janet Fleischman, "Saving Mothers, Giving Life: Attainable or Simply Aspirational?" CSIS, June 2012, <http://www.smartglobalhealth.org/blog/entry/saving-mothers-giving-life-attainable-or-simply-aspirational/>.

⁶ Hillary Clinton, "A World in Transition: Charting a New Path in Global Health" (remarks presented in Oslo, Norway, June 1, 2012), <http://www.state.gov/secretary/rm/2012/06/191633.htm>. Saving Mothers, Giving Life is a public-private collaboration between the governments of the United States and Norway, Merck Pharmaceuticals, the American College of Obstetrics and Gynecology, and the nongovernmental organization Every Mother Counts. See http://savingmothersgivinglife.org/about_smgl.html.

⁷ See the Merck for Mothers collaboration announcement at http://www.merckformothers.com/newsroom/smgl_announcement_june.aspx.

⁸ The program will initially focus on addressing the risks of labor and delivery in four districts each in Uganda and Zambia. Specific interventions will be intended to improve access of pregnant women to emergency obstetric care (EmOC) both by increasing the staff skills and other medical resources available at existing health facilities and by addressing the various transportation and other access challenges that have proven to be obstacles to adequate care for largely rural populations. U.S. resources will come from the President's Emergency Plan for AIDS Relief (PEPFAR), the U.S. Agency for International Development (USAID), and the Center for Disease Control and Prevention (CDC), the latter with reprogrammed funds.

⁹ Fleischman, "Saving Mothers, Giving Life."

¹⁰ The Every Mother Counts campaign is a U.S.-based advocacy project that works to support global maternal mortality reduction goals by educating U.S. and other audiences on the challenges facing women and girls worldwide. It was founded by Christy Turlington Burns, a writer, filmmaker, and model. See <http://everymothercounts.org>.

¹¹ The CSIS delegation focused on issues of gender-based violence, integration of family planning into PEPFAR and other HIV/AIDS programs, and women's health and maternal mortality. See Janet Fleischman, *HIV and Family Planning Integration in Tanzania: Building on the PEPFAR Platform to Advance Global*

those persons less familiar with the technical and organizational details of addressing maternal mortality for use as a guide to some of the complex challenges inherent in addressing these issues, as well as to recommend steps to increase the odds of success. The report uses data and observations from Tanzania and many other countries to describe the specific burdens on women's health that are associated with pregnancy, labor, and delivery. It discusses many of the major interventions currently being planned and/or implemented by developing country governments and their supporters, and it identifies key challenges for improving maternal mortality and women's health overall in developing countries. The report concludes with specific recommendations for long-term U.S. policy priorities, including:

1. A comprehensive U.S. government approach to women's health that rests on sustained high-level U.S. leadership in supporting access to emergency obstetric care (EmOC) as one critical intervention to reduce maternal mortality and that also looks beyond EmOC to address community-level cultural and behavioral factors involved in other women's health issues;
2. A clear focus on improving the quality, quantity, and use of data available to—and used by—host governments to assess and respond to their populations' maternal mortality burdens; and
3. Improving population access to family planning services as a critical component of both reducing maternal mortality and improving women's and children's health.

Women's Health, Maternal Mortality, and the Millennium Development Goals

In 2000, world leaders came together at the United Nations to establish the global Millennium Development Goals (MDGs)—eight time-bound targets for meeting the needs of the world's poorest people, with a deadline of 2015.¹² MDG 5 is “Improve maternal health,” and it incorporates two targets, the first of which is for each country to achieve a 75 percent reduction in maternal mortality, relative to their 1990 levels (see table 1).

Health (Washington, DC: CSIS, July 2012), http://csis.org/files/publication/120720_Fleischman_HIVFamPlan_Web.pdf, and Janet Fleischman, *Gender-Based Violence and HIV: Emerging Lessons from the PEPFAR Initiative in Tanzania* (Washington, DC: CSIS, July 2012), http://csis.org/files/publication/120709_Fleischman_GenderBasedViolence_Web.pdf, both of which report on the CSIS mission.

¹² Millennium Development Goals Indicators, “Official List of MDG Indicators,” <http://mdgs.un.org/unsd/mdg/Host.aspx?Content=indicators/officialist.htm>.

Table 1. Millennium Development Goal 5, Its Two Specific Targets and Its Six Indicators

2015 Millennium Development Goal 5: “To Improve Maternal Health”

Target 5.A: to reduce maternal mortality rate by $\frac{3}{4}$ between 1990 and 2015

1. Maternal mortality ratio (number of maternal deaths per 100,000 live births)
2. Proportion (%) of births attended by skilled health attendant

Target 5.B: to achieve universal access to reproductive health

3. *Contraceptive prevalence rate (proportion of women using modern methods)
4. *Adolescent birth rate (births to women <20 years old)
5. Antenatal care coverage (proportion of pregnant women with at least one antenatal clinic visit and the proportion with at least four visits)
6. *Unmet need for family planning

* This indicator is directly related to women’s access to family planning information and services.

In 1990, the estimated global maternal mortality ratio (MMR) was 400 deaths per 100,000 live births. Although the most recent (2010) global MMR estimate of 210 represents a 47 percent reduction, individual countries’ progress toward 2015 maternal mortality targets has been uneven. At current rates of progress, most resource-poor countries, including Tanzania, are unlikely to achieve their country-specific 75 percent mortality reduction targets by 2015 (see table 2).

According to the most recent UN consensus document covering years through 2010, of the 94 countries with the highest MMRs (>100) in 1990, 10 have already reached their 2015 mortality reduction goals, and 9 additional countries were judged to be “on track” to reach their 2015 goals. Fifty other countries, including Tanzania, while unlikely to achieve their respective 2015 goals, were judged to be “making progress.” Of the remaining 25 countries, 14 were considered to have made “insufficient progress” and 11 others “no progress” at all.¹³

Moreover, the mortality reduction target does not address any of the chronic nonfatal but still physically and/or socially disabling consequences of pregnancy that occur far more often than maternal death. For example, long-term or permanent physical, social, or emotional disabilities associated with pregnancy, such as infertility, chronic obstetric fistula with fecal or urinary incontinence, ruptured or prolapsed uterus, postpartum depression, severe nutritional deficiencies and injuries from intimate partner violence are 15 to 30 times more common than death in pregnancy.¹⁴

¹³ WHO, *Trends in Maternal Mortality: 1990–2010*.

¹⁴ See M. Boulvain, “Maternal Morbidity” (paper presented at 8th Postgraduate Course for Training in Reproductive Medicine and Reproductive Biology, Geneva, August 17, 2012), http://www.gfmer.ch/Endo/Lectures_08/maternal_morbidity.htm. See also UK Department for International Development (DFID),

Table 2. Other Possible Contributory Causes of Maternal Deaths in Resource-poor Countries

- Low (subordinate) social status of some women and some families
- Poverty at family and/or community level
- Lack of access to modern family planning
 - resulting in high fertility with unplanned pregnancies
- Child (young adolescent) marriages
- Polygamous (multi-wife) marriages
- Low community level awareness of danger signs of pregnancy/labor
- Violence (homicide, suicide) in pregnancy
- Rural location (i.e., long times to reach health facilities)
- Unwillingness (inability) of some pregnant women or families to attend ANC or to deliver in health facility and/or with assistance of skilled birth attendant
- Weak health systems, e.g.,
 - emergency transport gaps
 - facility location, capacities and equipment
 - staff quantity, quality (skills) and attitudes
 - supply chain difficulties

MDG 5's second target—"Achieve universal access to reproductive health"—has until recently received far less public attention than mortality reduction. Moreover, various goals to improve the overall health of women necessarily include a number of important issues that extend well beyond direct maternal health issues of women (e.g., girls' and women's access to secondary education, their exposure to violence, the prevention and/or timely treatment of cervical cancer, breast cancer, and other chronic disease, etc.) Greater societal attention to these latter challenges has been suggested as a way to "send a message that women are valued for more than their capacity to produce healthy children."¹⁵

"Choices for Women: Planned Pregnancies, Safe Births and Healthy Newborns," London, December 2010, <http://www.dfid.gov.uk/Documents/publications1/prd/RMNH-framework-for-results.pdf>.

¹⁵ Stephanie R. Psaki and Funmilola OlaOlorun, "More than Mothers: Aligning Indicators with Women's Lives," *The Lancet* 380, no. 9843 (August 25–31, 2012): 711–713.

Box 1. Major Direct and Indirect Causes of Maternal Mortality

Direct Causes (75–80% of deaths)

- Eclampsia/high blood pressure
- Postpartum hemorrhage
- Infection/Sepsis
- Unsafe Abortion
- Prolonged/Obstructed Labor

Indirect Causes (20–25% of deaths)

- Malaria (including anemia)
- HIV/AIDS
- Other forms of malnutrition
- Severe anemia from other causes (e.g., hookworm infection, vitamin A deficiency, blood loss from prior pregnancies)
- Hepatitis
- Diabetes

Defining, Measuring, and Estimating Maternal Mortality

The World Health Organization (WHO) defines a maternal death as the “death of a woman while pregnant or within 42 days of termination of pregnancy, irrespective of the duration and site of the pregnancy, from any cause related to or aggravated by the pregnancy or its management but not from accidental or incidental causes.”¹⁶ Using this definition, from one-half to two-thirds of all maternal deaths are estimated to occur within 24 hours of labor and delivery, the same period focused on by the Saving Mothers, Giving Life initiative.

The most obvious measure of maternal mortality is the actual number of maternal deaths that occur per year (or other specified period), estimated at 287,000 during 2010 (see table 3). Another commonly used indicator for the mortality risk of pregnancy in a specific population is the previously mentioned maternal mortality ratio (MMR), which is calculated by the number of maternal deaths per 100,000 live births.¹⁷ A similar sounding but conceptually very different

¹⁶ WHO, *Trends in Maternal Mortality: 1990–2010*.

¹⁷ Another maternal mortality indicator that is sometimes cited is the “proportion of all deaths of women 15–49 years old that are due to pregnancy-related causes.”

Location	MMR* in 1990	MMR* in 2000 (with range of estimates)	Maternal Deaths in 2010	Adult Lifetime Risk of Maternal Death of Current 15 Year Old ♀
World	400	210 (170-300)	287,000	One in 180
United States	12	21 (18-23)	880	One in 2,400
Southern Asia	590	220 (150-310)	83,000	One in 160
Sri Lanka	85	35 (25-49)	130	One in 1,200
India	600	200 (140-310)	56,000	One in 170
Sub-Saharan Africa	850	500 (400-750)	158,000	One in 39
Tanzania	870	460 (190-740)	8,500	One in 38
Uganda	600	310 (200-500)	4,700	One in 49
Zambia	470	440 (220-790)	2,600	One in 37

*MMR is the number of maternal deaths per 100,000 live births.

indicator is the maternal mortality *rate*, that is, the number of maternal deaths per 100,000 women 15 to 49 years old in the population, regardless of their pregnancy status. A third country-specific indicator is the adult lifetime risk of maternal death, which is the chance of a current 15-year-old woman dying of a pregnancy-related cause before age 49.¹⁹

A recent review has highlighted how the use of different maternal mortality indicators by different UN agencies results in inconsistencies in international recommendations.²⁰ But no matter which of these indicators is considered, the current global toll of avoidable pregnancy-related deaths is staggering.

Some of the data used to create these national and global maternal mortality estimates are collected from national vital registration systems that utilize formal death and birth certificates, as in the United States and many other countries. However, the vital registration systems of 115 of the 180

¹⁸ Data in this table are from WHO, *Trends in Maternal Mortality: 1990–2010*.

¹⁹ The lifetime risk calculation is based on the population's total fertility rate, which indicates the average lifetime number of pregnancies for each woman in the population, and the MMR, which indicates the mortality risk for each pregnancy.

²⁰ Sabine Gabrysch, Philipp Zanger, and Oona M.R. Campbell, "Emergency Obstetric Care Availability: A Critical Assessment of the Current Indicator," *Tropical Medicine and International Health* 17, no.1 (January 2012): 2–8.

countries included in the 2012 UN maternal mortality report were either incomplete (N=88) or nonexistent (N=27), meaning that some or all of their national mortality and live birth estimates could not be obtained and/or analyzed from death and/or birth certificates.

Although each of the maternal mortality indicators is commonly cited as a specific number, these data gaps mean that for many countries, the estimates for each mortality indicator include an extremely wide range of uncertainty. For example, Zambia's MMR for 2010 is listed as 440 (220–790), which means that the actual MMR value lies somewhere between 220 and 790. In contrast, the range of ambiguity for Sri Lanka's MMR of 35 is much narrower (25–49).

The magnitude of these uncertainty ranges is itself an indicator of the major difficulties inherent in estimating—and using—maternal (or infant) mortality numbers in populations that lack functioning vital registration systems. For countries with such large gaps in death and birth certification data, the needed numbers have to be estimated by statistical modeling of indirect data obtained from a wide variety of sources, such as a prior census, prior national or regional surveys, and/or various health facility records.²¹

Even the data coming from countries with apparently complete—or nearly complete—death registration systems have to be adjusted upward for the undercounting that occurs because pregnancy status is not always noted on death certificates of pregnant women who die from causes (e.g., malaria) that are not directly related to pregnancy.

After noting that less than one-third of maternal deaths globally are documented by death certificates, a recent WHO publication noted that “[countries] unable to record the number of people who die or why they die cannot realize the full potential of their health systems.”²²

Specific Causes of Maternal Deaths

The World Health Organization has estimated that about 15 percent of all pregnancies in all countries will have one or more complications that require “rapid and skilled obstetric care to prevent death or serious long-term morbidity.” However, because the occurrence of most life-threatening pregnancy and childbirth complications cannot be predicted accurately for individual women, health systems need to be prepared to provide EmOC and other essential care to all pregnant women.

Because knowing the specific causes and other circumstances of these life-threatening complications in a population is necessary for a health system to plan and implement effective

²¹ WHO, *Trends in Maternal Mortality: 1990–2010*.

²² Peter Waiswa et al. for the Social Autopsy Working Group, “Increased Use of Social Autopsy Is Needed to Improve Maternal, Neonatal and Child Health Programmes in Low-income Countries,” *Bulletin of the World Health Organization* 90, no. 6 (June 2012): 403–407. These critical data gaps and resulting uncertainties are the major reason that a WHO-sponsored commission has called for all countries to take steps to begin establishing vital records systems.

interventions, a number of different schemes have been promoted to categorize the causes of maternal deaths in particular settings.

Direct and Indirect Causes of Maternal Deaths

One frequently used mortality classification system divides the specific causes of maternal deaths into *direct* and *indirect* causes (see table 2). *Direct causes* of maternal mortality, estimated to be responsible for 75 to 80 percent of all maternal deaths, result directly from complications of pregnancy. Although the exact proportion due to each individual direct cause may vary depending on the specific location, data sources (e.g., hospital-based data vs. population survey data), and other circumstances, a recent summary of maternal cause-of-death data available from a large number of low- and middle-income countries included hemorrhage (25 percent), infection/sepsis (15 percent), eclampsia/high blood pressure (12 percent), unsafe abortion (13 percent), obstructed and/or prolonged labor (8 percent), and other (8 percent).²³

Hemorrhage at or just after delivery is more likely to be fatal in women who are already severely anemic before or during pregnancy.²⁴ Eclampsia (severe high blood pressure associated with prolonged seizures) in late pregnancy can be fatal to both mother and fetus if not treated rapidly with a specific intravenous medication. Eclampsia is reported to occur more frequently among adolescents than among older women,²⁵ is reported more frequently in obese women,²⁶ has been noted to be increasing in frequency in some countries, and was mentioned as the most common cause of maternal death at one of the labor and delivery sites visited in Tanzania. Obstructed and/or prolonged labor is seen most frequently in adolescent women whose pelvic structure has not yet matured. Unsafe abortion has been implicated in 13 percent of maternal deaths globally although its frequency is undoubtedly underreported and therefore underestimated in many places where abortion is illegal and/or highly stigmatized.

Categorization of specific direct mortality causes is further complicated by the fact that unsafe abortion and obstructed/prolonged labor, both of which occur more frequently in younger women in many countries, eventually result in death from severe infection (sepsis) or hemorrhage. For

²³ M. Omar Rahman and Jane Menken, "Reproductive Health," in *Global Health: Diseases, Programs, Systems and Policies*, 3rd ed., edited by Michael H. Merson, Robert E. Black, Anne J. Mills (Burlington, MA: Jones and Bartlett, 2012), 115–176.

²⁴ Common causes of severe anemia during pregnancy in resource-poor countries include maternal infections with malaria, hookworm, and/or HIV; chronic malnutrition; and maternal blood loss in prior pregnancies.

²⁵ Pierre Marie Tebeu et al., "Risk Factors for Eclampsia among Patients with Pregnancy-Related Hypertension at Maroua Regional Hospital," *International Journal of Gynecology and Obstetrics* 118, no. 3 (September 2012): 254–256.

²⁶ A.K. Mbah et al., "Super-obesity and Risk for Early and Late Pre-eclampsia," *British Journal of Obstetrics and Gynaecology* 117 (2010): 997–1004. It may also be noteworthy that the prevalence of adult obesity is rising in many countries.

example, of 18 unsafe abortion-related deaths noted in a 1996 maternal mortality review from Zimbabwe, 100 percent “were primarily due to sepsis.”²⁷

Indirect causes of maternal mortality, responsible for 20 to 25 percent of all maternal deaths, includes those diseases or conditions (e.g., HIV/AIDS, hepatitis, diabetes, malaria, and/or anemia related to deficiencies of iron [e.g., from hookworm infection] or vitamin A) that are not part of pregnancy per se but that aggravate, or are aggravated by, the physiologic effects of pregnancy—that is, changes in body weight, blood volume, hormone balance, and immune system function. Although such changes occur and are considered normal in virtually all pregnancies, they can reduce the body’s reserve capacity to successfully withstand the stresses of certain diseases.²⁸

Malaria is the leading indirect cause of maternal mortality in sub-Saharan Africa,²⁹ at least in part because malaria’s clinical course can be especially severe in pregnant women. Even the anemia of a mild malaria infection can increase the mortality risk from a postpartum hemorrhage.

In some countries, HIV/AIDS has an exceedingly large impact on maternal mortality, with an estimated 17,000 of the world’s 19,000 AIDS-related maternal deaths occurring in sub-Saharan Africa. In Tanzania, Uganda, and Zambia, for example, the 2010 estimates were that AIDS accounted for 25 percent, 31 percent, and 39 percent respectively of all indirect maternal deaths.³⁰

The “Three Delays”

Since most maternal deaths are caused by conditions that could be treated successfully with access to adequate emergency obstetric care (EmOC), a useful classification scheme focuses on the logistical and operational reasons for the delay(s) experienced by women before receiving needed care.

Reasons are categorized into one of “Three Delays.” Type 1 are delays in decisions to seek care by pregnant women, their husbands, or other decisionmakers in their families; Type 2 are delays in arriving at a health facility after a decision is made to seek care; and Type 3 are delays in receiving appropriate care after arriving at the health facility (see box 2).³¹

²⁷ Susan Fawcus et al., “Unsafe Abortions and Unwanted Pregnancies Contribute to Maternal Mortality in Zimbabwe,” *South African Medical Journal* 86, no. 4 (April 1996): 430–436.

²⁸ Divya A. Patel, Nancy M. Burnett, and Kathryn M. Curtis, “Maternal Health Epidemiology” (Module 2 in the Reproductive Health Epidemiology Series), Atlanta, Centers for Disease Control and Prevention, 2003.

²⁹ Maria Bordallo, “Malaria and Maternal Mortality: Access of Women to Malaria Prevention and Treatment” (paper presented at the Humanitarian Congress of the German Foundation for World Population [DSW], Berlin, October 24, 2008), <http://www.humanitaererkongress.de/obj/dokumente/Bordallo.pdf>.

³⁰ WHO, *Trends in Maternal Mortality: 1990–2010*.

³¹ Sreen Thaddeus and Deborah Maine, “Too Far to Walk: Maternal Mortality in Context,” *Social Science and Medicine* 38, no. 8 (1994): 1091–1110.

Box 2. The “Three Delays” as They Relate to Causes of Maternal Mortality

The First Delay: delays at community level in recognizing an emergency situation and/or delays in decision to seek care at health facility.

The Second Delay: delays in reaching appropriate care due to lack of access to transport or lack of resources to pay for transport.

The Third Delay: delays in receiving appropriate care—including adequate quality of care—after arrival at a health facility.

This classification system has the advantage of highlighting some of the underlying cultural, socioeconomic, geographic, and health system challenges to ensuring women’s access to emergency care in pregnancy. These include, for example:

- The limited ability of some pregnant women and their family members to recognize pregnancy-related emergencies;
- Culturally determined gender norms that deny women the ability to decide when and where to seek care, without their husband’s or other family members’ permission;
- Health facilities that are difficult to reach from women’s usual residences;
- The absence of any vehicle to use for emergency transport and/or lack of money to pay for emergency transport or to buy medicines or other supplies after reaching a health facility; and
- Weak health systems, as reflected by inadequate staffing, training, equipment, medications, or other commodities at many health facilities.

Data from such “Three Delays” analyses can be used to identify and address the most problematic hurdles to women’s obtaining adequate care.

Other Contributory Causes of Pregnancy-Related Deaths

Additionally, socioeconomic characteristics of families, communities, and countries, as well as some culturally determined individual behaviors, can complicate efforts to prevent maternal deaths or other poor pregnancy outcomes. These various contributory causes do not all fit easily into current maternal mortality classification schemes, and interventions are neither simple nor quick to plan, implement, and/or evaluate; however, each must be effectively addressed in order to achieve and maintain low levels of maternal mortality.

In Tanzania, for example, where 75 percent of the population live in rural areas, issues raised repeatedly during the CSIS delegation’s visit included the low social status of women, in terms of their overall lack of autonomy in decisionmaking about important family issues including their own health; widespread poverty; the frequency of unplanned pregnancies, including among

adolescents; and women’s reluctance—or inability—to plan facility-based deliveries.³² These issues are clearly not specific to Tanzania but are representative of challenges found in many other countries.

Finally, one other complex issue linked to pregnancy risks—including to maternal mortality—that is rarely discussed is gender-based violence, including intimate partner violence (IPV).³³ Although there is a general consensus that homicides and suicides (as well as other severe forms of violence) occur more often during pregnancy than at other times,^{34, 35} including in the United States, deaths during pregnancy that are due to homicide or suicide are excluded from most current maternal mortality definitions, including the WHO definition, which explicitly excludes deaths “from accidental or incidental causes.”³⁶

For example, over the period 1988 to 1996, when Washington, DC, officially reported 21 pregnancy-related deaths, an additional 13 homicide deaths of pregnant women were not reported officially as pregnancy-related deaths.³⁷ Because IPV and other gender-based violence is common in most countries, it seems reasonable to assume that at least some violence-related deaths in pregnancy go unreported in official maternal mortality reporting systems in other countries.

³² Reports of maternal mortality assessments from a number of countries, including Tanzania, have mentioned the demeaning actions and perceived negative attitudes toward patients sometimes noted among health workers as reasons that many rural women do not want to deliver in health facilities.

³³ Intimate partner violence (IPV) has been defined by CDC as physical, sexual, or psychological harm by a current or former partner or spouse. In the United States, rates of IPV during pregnancy vary from 4 to 8 percent. Although studies from developing countries have not been systematically reported, IPV rates above 30 percent have been reported from some countries. See Rebecca J. Cook and Bernard M. Dickens, “Dilemmas in Intimate Partner Violence,” *International Journal of Gynecology and Obstetrics* 106 (2009): 72–75; and Danny Salazar-Pousada et al., “Intimate Partner Violence and Psychoemotional Disturbance among Pregnant Women Admitted to Hospital with Prenatal Complications,” *International Journal of Gynecology and Obstetrics* 118 (2012): 194–197.

³⁴ Based on results from an enhanced surveillance system, homicide was found to be the leading cause of death in pregnancy in Maryland from 1993 to 1998. See Isabel L. Horon and Diana Cheng, “Enhanced Surveillance for Pregnancy-Associated Mortality—Maryland, 1993–98,” *JAMA* 285, no. 11 (March 21, 2001): 1455–59.

³⁵ S. Frautschi, A. Cerulli, and Deborah Maine, “Suicide during Pregnancy and its Neglect as a Component of Maternal Mortality,” *International Journal of Obstetrics and Gynecology* 47 (1994): 275–284.

³⁶ The most recent set of international medical diagnostic codes (ICD-10) includes a new (and supplementary) diagnostic category of “pregnancy-related death” that includes “the death of a woman while pregnant or within 42 days of termination of pregnancy, irrespective of the cause of death.” At the time this report was being prepared, this definition had not yet come into widespread use.

³⁷ Cara J. Krulewicz et al., “Hidden from View: Violent Deaths among Pregnant Women in the District of Columbia, 1988–96,” *Journal of Midwifery & Women’s Health* 46, no. 1 (January-February 2001): 4–10.

Interventions for Reducing Maternal Mortality and Morbidity

In 1987, WHO and other groups launched the Safe Motherhood Initiative—a global campaign to raise awareness among policymakers about maternal mortality. However, maternal mortality did not decrease significantly over the subsequent decade, a shortfall attributed to the initiative’s lack of strategic focus and actionable agenda and goals.³⁸

Several years later, in 1992, a landmark publication by McCarthy and Maine provided a framework for examining the causes of maternal mortality and highlighted the three target events that must occur before a maternal death can result: (1) a conception; (2) a serious complication of pregnancy; and (3) an adverse outcome of that complication, with or without treatment. Perhaps not surprisingly, the authors’ analysis found that societies with the lowest levels of maternal mortality had achieved this result “by preventing pregnancies, by reducing the incidence of certain complications, and by having adequate facilities and well-trained staff to treat the complications.”³⁹

Today, the three major categories of interventions available to avert adverse pregnancy outcomes are drawn directly from this analysis:

1. Preventing unplanned pregnancies;
2. Preventing or treating complications of pregnancies; and
3. Averting deaths or disabilities from such complications.

Similarly, the four most critical maternal mortality interventions identified by WHO are participation in antenatal care (ANC), delivery by skilled birth attendants, access to emergency obstetric care (EmOC), and provision of family planning services.⁴⁰

Antenatal Care, Skilled Birth Attendants, Emergency Obstetric Care, and Postpartum Care

Participation in antenatal care (ANC) programs has been demonstrated to increase markedly the proportion of women who deliver at health facilities.⁴¹ ANC participation is also an opportunity to provide or reinforce to women (and their families) messages about HIV prevention and

³⁸ Deborah Maine and Allen Rosenfield, “The Safe Motherhood Initiative: Why Has it Stalled?” *American Journal of Public Health* 89 (1999): 480–482.

³⁹ McCarthy and Maine, “A Framework for Analyzing the Determinants of Maternal Mortality.”

⁴⁰ WHO, “WHO Recommended Interventions for Improving Maternal and Newborn Health,” http://whqlibdoc.who.int/hq/2007/WHO_MPS_07.05_eng.pdf.

⁴¹ Harinder Guliani, Ardeshir Sepehri, John Serieux, “What Impact Does Contact with the Prenatal Care System Have on Women’s Use of Facility Delivery? Evidence from Low-income Countries,” *Social Science & Medicine* 74, no. 12 (June 2012): 1882–1890.

postpartum access to family planning. Finally, although assessment of the antenatal health status of pregnant women has not proven useful for predicting the eventual occurrence of severe complications of pregnancy, ANC provides an opportunity to educate women and their families about the danger signs that sometimes occur in pregnancy and labor and about the need for a birth preparedness plan, including planning for emergencies.

The presence of a skilled birth attendant at delivery has also been shown to markedly reduce postpartum hemorrhage and other causes of maternal mortality.⁴² Much of the benefit of having a skilled attendant at delivery occurs through the process of “Active Management of the Third Stage of Labor,” a concept that refers to minimization of maternal blood loss during and after delivery of the placenta by administration of a (uterotonic) drug that causes strong contractions of uterine muscle followed by measures to ensure complete delivery of the placenta.⁴³

Because skilled birth attendants are still in short supply in many countries, there have been efforts in some countries to upgrade the skills of the far more numerous traditional birth attendants and then to integrate them into more formal pregnancy care systems. Some countries, however, have decided against allowing traditional birth attendants to participate in official labor and delivery care. Elsewhere, some programs that include reduced delivery fees at health facilities or conditional cash transfer payments to expectant mothers have apparently been successful in persuading them to give birth in health facilities, although results of controlled studies looking at pregnancy outcomes are still lacking.⁴⁴

Providing temporary “maternity waiting homes” close to health facilities has been tried in a number of places as a way to provide women in late pregnancy with easy access to facilities as they labor and deliver. However, although the benefits of maternity waiting homes have been documented for newborn outcomes (e.g., lower stillbirth rates), their value in reducing maternal mortality has not been conclusively demonstrated yet. In fact, a July 2012 systematic review of controlled studies of the effectiveness of emergency interventions in rural areas for overcoming Type 2 delays in women’s arriving at a health facility after deciding to seek care was unable to document the effectiveness of any of these interventions.⁴⁵

Although the logic of designing direct interventions to overcome Type 2 delays seems obvious, the reality may be more complex. For example, the same researchers pointed out that, of the nine

⁴² Oona M.R. Campbell and Wendy Graham, “Strategies for Reducing Maternal Mortality: Getting On with What Works,” *The Lancet* 368, no. 9543 (October 7, 2006): 1284–1299.

⁴³ The third stage of labor is the delivery of the placenta, which follows the first two stages of dilation of the uterine cervix and delivery of the infant, respectively. See FIGO Safe Motherhood and Newborn Health Committee, “Prevention and Treatment of Postpartum Hemorrhage in Low-resource Settings,” *International Journal of Gynecology and Obstetrics* 117 (2012): 108–118.

⁴⁴ Kate Jehan et al., “Improving Access to Maternity Services: An Overview of Cash Transfer and Voucher Schemes in South Asia,” *Reproductive Health Matters* 20, no. 39 (June 2012): 142–154.

⁴⁵ Julia Hussein et al., “The Effectiveness of Emergency Obstetric Referral Interventions in Developing Country Settings: A Systematic Review,” *PLoS Medicine* 9, no. 7 (July 2012).

studies they located that examined the impact of interventions on the proportion of women delivering in health facilities, three found that rates of facility delivery were actually *lower* in the intervention group than in the control group. In addition, the authors noted that outcomes of programs based on use of mobile phone technology were not yet available at the time of their review. Although the appeal of mobile phone–based interventions also seems obvious, such interventions still need careful evaluation.

Those same authors recommended that any and all programs intended to improve maternal mortality be rigorously planned, monitored, and evaluated in a way that allow the design of future programs to benefit from the lessons learned in the course of the successes and failures of the earlier programs.

Another systematic review focused on published studies of programs intended to overcome Type 3 delays (i.e., delays in receiving appropriate care after arriving at the health facility) and was able to identify a number of evidence-based maternal mortality reduction benefits.⁴⁶ However, the authors of this latter review noted that even successful maternal mortality interventions were not always scaled up, for reasons including insufficient political commitment; absence of enabling policies; inadequate funding and human resources within health systems; and some end user–related factors, such as poverty, illiteracy, early marriage, and lack of women’s autonomy in decisionmaking.

Basic and Comprehensive Emergency Obstetric Care (EmOC)

The six capacities required of basic Emergency Obstetric Care (EmOC) include:

1. Providing antiseizure medication by injection or intravenously;
2. Delivering the newborn with instruments;
3. Manually removing the placenta;
4. Providing uterotonic drugs by injection or intravenously to stop uterine bleeding;
5. Removing any retained products of conception from the uterus; and
6. Providing appropriate antibiotics by injection or intravenously.

In addition to providing EmOC as needed, health facilities at the next higher level of care—that of Comprehensive Emergency Obstetric Care (CEmOC)—must also be equipped and staffed to provide blood transfusions and caesarian sections as needed.

⁴⁶ Angelo S. Nyamtema, David P. Urassa, Jos van Roosmalen, “Maternal Health Interventions in Resource Limited Countries: A Systematic Review of Packages, Impacts and Factors for Change,” *BMC Pregnancy & Childbirth* 11, no. 30 (April 2011).

There is little doubt that access to adequate EmOC and CEmOC can markedly reduce the immediate mortality and morbidity risk for pregnant women who experience severe complications of pregnancy, labor, and/or delivery⁴⁷ and that providing access to EmOC is required for substantial reductions in maternal mortality.⁴⁸ Research in Tanzania and elsewhere has demonstrated that nonphysician clinicians such as nurse-midwives, clinical officers, and assistant medical officers can be trained in teams to successfully provide lifesaving EmOC and anesthesia in remote health facilities.⁴⁹

Postpartum Care

WHO and others have made recommendations for providing care to women in their postpartum period, defined as the first six weeks (42 days) after the end of pregnancy. In addition, this postpartum concept includes provision of adequate postabortion care.⁵⁰ Postpartum care does not always occur as recommended, however, and new data suggest that the high mortality risk of a complicated pregnancy, labor, and/or delivery may extend well beyond six weeks. One recent observation is that women who survive “near miss” obstetric complications—that is, direct causes of mortality and other complications severe enough to have resulted in death if the women had not received EmOC—have a mortality risk in the following four years that is nearly six times the mortality risk of women who did not have such a “near miss.”⁵¹

Audits and Other Reviews of Circumstances of Maternal Deaths

Research and practice in Tanzania and elsewhere has demonstrated the value of regular reviews of the circumstances surrounding maternal deaths or “near misses,” combined with steps to address identified shortcomings. Such reviews could include national or regional assessments in places where vital records or other mortality surveillance systems allow identification of all or nearly all maternal deaths; confidential and nonpunitive health facility–based audits of circumstances leading to deaths of women who reached the facilities; and community-based maternal death reviews using verbal autopsy and social autopsy techniques to understand the medical and social factors that led to pregnancy-related deaths outside of health facilities.

⁴⁷ UN Population Fund (UNFPA), *Maternal Mortality Update 2002: A Focus on Emergency Obstetric Care* (New York: UNFPA, 2003), http://www.unfpa.org/upload/lib_pub_file/201_filename_mmupdate-2002.pdf.

⁴⁸ Maine and Rosenfield, “The Safe Motherhood Initiative.”

⁴⁹ See for example, Angelo S, Nyamtema et al., “Tanzanian Lessons in Using Non-Physicians to Scale Up Comprehensive Emergency Obstetric Care in Remote and Rural Areas,” *Human Resources for Health* 9, no. 28 (2011).

⁵⁰ Jerker Liljestrand, “Strategies to Reduce Maternal Mortality Worldwide,” *Current Opinion in Obstetrics and Gynecology* 12, no. 6 (December 2000): 513–517.

⁵¹ Katerini T. Storeng et al., “Mortality after Near-Miss Obstetric Complications in Burkina Faso: Medical, Social and Health-care Factors,” *Bulletin of the World Health Organization* 90, no. 6 (June 2012): 418–425.

But while such data collection and analysis activities are necessary to identify the characteristics of a local or national maternal mortality challenge, data collection and analysis alone are insufficient. The key to success in reducing maternal mortality is a high-level commitment to act on the data and other information coming from audits and other assessments.

Timely Access to Family Planning Services

Within a given time frame, the maternal mortality burden in any population is a function of two factors: the risk of maternal death associated with pregnancies in that population and the number of pregnancies in that population. While greater ANC attendance, greater presence of skilled birth attendants at delivery, more deliveries in health facilities, and better access to EmOC all have important roles to play in reducing the risk of maternal death, another critical intervention is to reduce the numbers of unplanned pregnancies.

Although access to—and uptake of—modern family planning has been identified by WHO and many other institutions and individual experts as a critical intervention to reduce maternal mortality, and although addressing the unmet need for modern family planning⁵² is one of six indicators to be measured in monitoring MDG 5, progress on these family planning indicators has been particularly slow in sub-Saharan Africa.⁵³

By reducing the numbers of conceptions and pregnancies in a population, greater access to effective family planning services can reduce maternal mortality in at least four different ways.

First, even if a population's MMR (number of maternal deaths per 100,000 live births) does not change, simply reducing the total number of pregnancies (and thus the number of live births) in a population will proportionally decrease the number of women who develop severe pregnancy complications resulting in death.

Second, delaying first pregnancies to a time beyond adolescence will reduce the number of conceptions and pregnancies—and thus the number of maternal deaths—among younger women

⁵² The “unmet need for modern family planning” is the percentage of women who do not want to become pregnant but who are not using modern methods of contraception. Modern contraceptive methods include intrauterine devices (IUDs), implants, injectible contraceptives, pills, male and female condoms, spermicides, and male and female sterilization. See Susheela Singh and Jacqueline E. Darroch, “Adding It Up: Costs and Benefits of Contraceptive Services: Estimates for 2012,” UNFPA/Guttmacher Institute, June 2012, <https://www.unfpa.org/webdav/site/global/shared/documents/publications/2012/AIU%20Paper%20-%20Estimates%20for%202012%20final.pdf>. In fact, three of the six official target indicators for MDG 5 are (1) the contraceptive prevalence rate, (2) the adolescent birth rate, and (3) the population's unmet need for family planning.

⁵³ Don Lauro, “Abortion and Contraceptive Use in Sub-Saharan Africa: How Women Plan their Families,” *African Journal of Reproductive Health* 15, no. 1 (March 2011): 13–23.

who are at a particularly high mortality risk because their immature pelvic structure can result in obstructed or prolonged labor.⁵⁴

Third, based on the limited available data indicating that unsafe abortions—and deaths from unsafe abortions—occur more often among adolescents and older women with unplanned pregnancies, interventions that decrease the numbers of unplanned pregnancies are likely to result in fewer deaths related to unsafe abortions.

Finally, women who have already had five or more previous pregnancies and deliveries are at greater risk of death during each subsequent pregnancy than women with fewer prior pregnancies.⁵⁵ Reducing the numbers of unplanned pregnancies among these particularly high-risk women can lead to a large decrease in overall numbers of women dying in pregnancy.

Using multiple data sources from 167 countries, Ahmed, Li, Liu, and Tsui recently calculated that satisfying the current global unmet need for contraception would result in a rapid 29 percent annual reduction in maternal deaths from current levels.⁵⁶

In addition to fewer maternal deaths, another clear benefit of reducing the number of unplanned pregnancies will be a reduction of infant mortality. In part, this will be achieved through better birth spacing, as children born less than two years before or after the birth of their siblings have been found to have higher rates of mortality during their first five years of life.⁵⁷ In addition, it will lower the number of infants born at extremely high mortality risk because their mothers died during or soon after delivery.

Recommendations for U.S. Women’s Health and Maternal Mortality Activities

U.S. global health policy goals and the international community’s 2015 Millennium Development Goals both include reduction of maternal mortality as an important component of worldwide efforts to improve the health of women and girls (see box 3). Substantial resources should be devoted toward accelerating progress. With its focus on improving women’s access to EmOC, the new Saving Mothers, Giving Life collaboration represents an important component of that progress.

⁵⁴ Save the Children, *Every Woman’s Right: How Family Planning Saves Children’s Lives* (London: Save the Children, 2012), http://www.savethechildren.org/atf/cf/%7B9def2ebe-10ae-432c-9bd0-df91d2eba74a%7D/EVERY_WOMANS_RIGHT_REPORT_JUNE_2012.PDF.

⁵⁵ Singh and Darroch, “Adding It Up.”

⁵⁶ Saifuddin Ahmed et al., “Maternal Deaths Averted by Contraceptive Use: An Analysis of 172 Countries,” *The Lancet* 380, no. 9837 (July 14, 2012): 111–125.

⁵⁷ Wendy Graham et al., “Maternal and Perinatal Conditions,” in *Disease Control Priorities in Developing Countries*, 2nd ed., edited by Dean T. Jamison et al. (New York: Oxford University Press/World Bank, 2006), <http://files.dcp2.org/pdf/DCP/DCPFM.pdf>.

Box 3. Components of a Comprehensive Safe Motherhood Strategy

- Access to adolescent reproductive health education and services
- Access to family planning information and services
- Access to community education on safe motherhood
- Access to evidence-based antenatal care and counseling
 - Nutritional advice and supplements (iron, vitamins, micronutrients)
 - Blood pressure screening
 - Preparation of birth preparedness plan, including preparing for emergencies
 - Screening for HIV and other sexually transmitted infections
 - Antiretroviral drugs and infant feeding advice for HIV-infected ♀
 - Diagnosis and treatment of urinary tract infections
 - Tetanus toxoid administration
 - Access to bed nets and intermittent preventive therapy in pregnancy (for malaria)
- Access to safe abortion and postabortion care
- Access to skilled assistance at delivery
- Access to care of obstetric complications and emergencies
- Access to postpartum care

Source: Adapted from Graham et al., "Maternal and Perinatal Conditions."

Expectations of rapid and sustained reductions in maternal mortality should be tempered, however, by the difficulties inherent in addressing the cultural, behavioral, socioeconomic, health system, and other structural challenges that are deeply embedded in the social structures of many resource-poor countries. In particular, the challenges of mobilizing and maintaining political will to address structural issues are likely to be difficult ones.

Recommendation 1: Proceed with a Comprehensive Plan

Going forward, U.S. global health policy should include a realistic, comprehensive long-term plan for improving women's health that focuses heavily on—but is not limited to—reducing the number of maternal deaths. In addition to maintaining a clear, consistent, and well-resourced focus on the "medical model" of improving women's access to ANC, skilled birth attendants, facility deliveries, and the various components of EmOC, U.S. efforts should include:

- A community-oriented maternal health focus to help better identify and address the community-level cultural, behavioral, and socioeconomic factors that can contribute to maternal mortality through delays in women's seeking care and/or delays in their reaching

health facilities. The direct involvement of community and family leaders, including men, will be particularly important.

- The inclusion, wherever possible, of fatal pregnancy-associated violence (e.g., homicide or suicide of pregnant women) in discussions of, assessments of, and programs to prevent maternal mortality (e.g., Saving Mothers, Saving Lives). Currently, these forms of pregnancy-related violence are explicitly *excluded* from the most commonly used definitions of maternal mortality.
- A focus on the nonfatal but medically and/or socially disabling consequences of pregnancy, labor, and delivery (e.g., infertility, chronic fistula, prolapsed uterus, physical and/or emotional injuries from IPV) that occur 15 to 30 times as often as maternal deaths. Women with these conditions, as well as women who survive a “near miss” obstetric emergency, should be given access to postpartum programs where they can receive appropriate assessment, resources, and other support.
- The integration of maternal mortality and maternal health concerns, including nonfatal violence in pregnancy, into ongoing U.S.-supported programs that address related issues such as gender-based violence (GBV), women’s empowerment, girls’ education, child survival, and HIV/AIDS care, treatment, and prevention.

Recommendation 2: Improve Quality, Quantity, and Use of Data

Despite all the discussion about—and resources put into—global maternal mortality prevention and mitigation since the Safe Motherhood Initiative began in 1987, more and better data are still needed to more precisely assess population-level maternal mortality and women’s health status, to design and conduct mortality reviews in individual health facilities and in communities, and to measure the impact and effectiveness of programs to reduce maternal mortality and improve maternal health. The existing data gaps and resulting statistical—and planning—uncertainties underscore the importance of improving the collection, analysis, and use of accurate data as integral components of strong national health systems.

- **Vital Registration:** In order to help strengthen health systems in a way that promotes sustainability and country ownership and that leads to collection of increasingly precise maternal mortality data, U.S. and other external donors should support long-term efforts in resource-poor countries to help create—and/or expand coverage of—vital registration systems that can reliably certify deaths and births.
- **Maternal Death Reviews and Audits:** U.S. and other external donor resources directed at maternal mortality reduction should help build the capacity of national health systems in resource-poor countries to create and gradually expand systems of maternal mortality assessment at individual health facilities (as audits) and within communities (as maternal death reviews). As data quality improves, these assessments should be expanded to district, regional, and national levels. Support for audits and other assessments should be based on sanction-free participation by all levels of health professionals—including health policymakers—in analyzing

past events and should encourage action by the same participants to address identified challenges.

- Verbal and social autopsies should be used in a nonjudgmental manner to assess maternal deaths that occur outside of health facilities (i.e., at community levels) to begin gathering information on both the medical factors and modifiable nonmedical factors involved in out-of-facility maternal deaths.
- Formal evaluations of program effectiveness and impact should be integral components of every U.S.-supported program intended to reduce maternal mortality and/or otherwise improve women's health. Plans and resources necessary for ongoing program impact evaluation should be an integral part of every intervention program design. Results of program impact evaluations should be widely shared, discussed, and their lessons used for planning of subsequent programs.

Recommendation 3: Further Reduce Maternal Deaths through Expanded Family Planning Services

There is little doubt that in resource-poor countries with high maternal mortality, better access to family planning services would reduce the numbers of unplanned pregnancies, unsafe abortions, and maternal deaths. In most of these countries, the contraceptive prevalence rate (CPR), the unmet need for family planning, and the adolescent birth rate are each indirect indicators of the maternal mortality reductions that could be achieved through improving access to family planning services.

- U.S.-supported programs in resource-poor countries that focus on reducing maternal mortality as a component of improving women's health should include specific programs to increase the population's contraceptive prevalence rate (CPR), reduce the population's unmet need for family planning, and reduce the population's adolescent birth rate.
- Measurement of these family planning indicators should be routine components of evaluations of programs to improve maternal mortality, maternal and child health, and women's health.
- Structural Obstacles: If and when structural and other obstacles to expansion of family planning components of programs to reduce maternal mortality are encountered, they should be explored, documented, and addressed in a transparent manner.

[S]urviving childbirth and growing up healthy should not be a matter of luck or where you live or how much money you have. It should be a fact for every woman everywhere. And I think we can make this happen, and by doing so, bring the world closer to recognizing that working together we not only can save lives, we can help improve them....

Secretary Of State Hillary Clinton
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