GUTTMACHER INSTITUTE

TO: Interested Parties

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SUBJECT: Estimating Induced Abortion Incidence:
Rebuttal to a Critique of a Guttmacher Methodology

In a report published in the Bioethics section of the May 2012 issue of the journal *Ginecología y Obstetricia de México*,[1] Elard Koch, of Chile's Catholic University of the Most Holy Conception, et al. criticized an approach developed by the Guttmacher Institute to estimate the number and rate of induced abortions and complications from unsafe abortions in countries where the procedure is highly legally restricted. As Koch and colleagues note, that approach, the abortion incidence complications method (AICM), has been applied to Argentina, Brazil, Chile, Colombia, the Dominican Republic, Guatemala, Mexico and Peru. Their critique focuses largely on the most recent Guttmacher publication on the incidence of abortion and abortion complications in Colombia.[2] We strongly dispute their criticisms, as well as an alternative methodology that they suggest, which is based on assumptions that are both simplistic and incorrect.

THE AICM

In countries where abortion is highly legally restricted—and in some where it is legal and accessible, but is still unsafe because of social stigma or for other reasons—documenting incidence is extremely difficult. The primary reason for this is that when abortion is illegal or stigmatized, the procedure is performed in secrecy; as a result, women are reluctant to report it, and providers are reluctant to register it. Researchers have developed, and continually work to improve, indirect measurement approaches to assess abortion incidence in contexts where it cannot be measured directly. These approaches yield estimates, rather than exact values.

The AICM is one such approach. It was developed about 20 years ago[3,4] and has been widely used in studies that have appeared in reputable peer-reviewed journals.[2,3,5-8] It is recognized by experts in both the academic community and international organizations, such as the World Health Organization (WHO).[9-15]

Two types of data are needed to implement the method: *the number of women who receive facility-based treatment for induced abortion complications*; and *the proportion of all women having abortions who receive facility-based treatment for complications*.

The number of women who receive facility-based treatment for induced abortion complications is obtained in different ways, depending on the country, the available data and the quality of the data. It most commonly comes from one of two sources: official health statistics, where these are known to be of high quality; or, where official data are poor or unavailable, a country-specific Health Facilities Survey (HFS), which includes a nationally representative sample of all health facilities that provide postabortion care.

The proportion of all women having abortions who receive facility-based treatment for complications is obtained through a Health Professionals Survey (HPS), which is conducted among experts who are knowledgeable about abortion provision in the study country and who can estimate the proportion of women who develop complications and the proportion who receive treatment for them. These proportions are the basis for calculating a multiplier, or inflation factor, that is applied to the number of women treated in health facilities for induced abortion complications to yield the total number of induced abortions.

How Koch and Colleagues Misrepresent the AICM

Koch et al. state that the estimates we have generated using the AICM have no scientific value from an epidemiological perspective because they do not rely on hospital discharge data and because both the HFS and the HPS represent the subjective opinions of only a few persons. They further charge that estimates derived from the AICM are based on "imaginary numbers" underlying those opinions. We strongly object to these criticisms.

●**Hospital discharge data.** We do not dismiss information available from hospital records. In countries that have hospital records of good quality, the AICM uses this information to estimate the number of women who receive facility-based treatment for induced abortion complications, and no HFS is necessary. That was the case for our 2006 estimates for Mexico[8] and 1989 estimates for Colombia.[3] A second study of Colombia, which produced estimates for 2008,[2] used an HFS because the quality of hospital records had deteriorated to an unacceptable level after decentralization and the reform of the health system in 1993.[16,17]

●**Health Facilities Survey data.** Koch et al. state that the Colombia HFS is based on a convenience sample. This could not be further from the truth. The sample was selected through use of a multistage stratified cluster sampling technique. In the first stage, the 24 departments that have 98% of the population were stratified by region and, within each region, by poverty level (measured as the percentage of the department's total population with unmet basic needs, as defined by the Departamento Administrativo Nacional de Estadística of Colombia). Ten departments (including Bogotá) were randomly selected for the survey, with a probability of selection proportional to population size.

In the second stage, a probability sample of health facilities by type was selected. From a list of all public and private health facilities provided by the Ministry of Social Protection, 1,252 were identified as providing abortion-related services. The proportion of facilities sampled varied depending on the level of specialization in providing postabortion care (classified according to the facility's technological capacity and staff expertise), the facility type (primary, secondary or tertiary), the type of care provided

(inpatient or outpatient) and the number of facilities in a particular sample category (high proportions were sampled for categories that had a small number of facilities, to ensure adequate representation). As suggested in random sample theory,[18,19] a 1% sample would have provided an adequate sample size to obtain estimates of acceptable accuracy for a study population, while a sample of 10% would have been considered excellent, with very low standard errors. We randomly sampled 339 facilities, or 27% of the 1,252 in the sampling frame; this total made the sample extremely reliable and ensured that standard errors were very small. To capture variation between facilities with relatively large postabortion care caseloads, and to reduce the standard error, we oversampled this type of facility. The sampling fractions are as follows: 100% of facilities with the highest level of specialization (these facility types thus have a standard error of zero, as in a census); 50% of facilities that either had a medium level of specialization and provided both inpatient and outpatient services, or had a low level of specialization and provided only outpatient care; 10% of facilities that had a medium level of specialization and provided only outpatient care; and 13% of facilities that had a low level of specialization and provided both outpatient care and inpatient care.

Contrary to the erroneous impression created by Koch et al., HFS respondents were the senior staff members most knowledgeable about facilities' provision of postabortion care. Most were obstetrician-gynecologists or directors of obstetrics and gynecology hospital services; a small proportion were head nurses. Respondents were asked whether their facilities provided treatment of spontaneous or induced abortion complications; if so, they were asked to estimate the number of women receiving postabortion care.

We challenge the statement by Koch et al. that the heads of hospital obstetrics and gynecology departments do not have any knowledge about the postabortion patients seen in their facilities every day. These senior health professionals are directly involved in the provision and supervision of postabortion care and are the best situated to answer the survey. It is difficult to imagine that the heads of obstetrics and gynecology departments of hospitals in Latin America—including in Chile, where Koch and his colleagues live and work—are ignorant of their departments' caseload of postabortion care patients or unable to answer questions related to this service.

●**Health Professionals Survey data.** Similarly, Koch et al. make erroneous statements about the HPS: that it is based on a convenience sample and that respondents are not equipped to provide the type of information requested.

The HPS obtains the data used to arrive at the total number of women who have induced abortions; it interviews a large number of professionals and is completely separate from the HFS. Our publication on abortion in Colombia[2] clearly states that the HPS was administered to a purposive sample of health professionals knowledgeable on the issue of abortion to obtain their opinions about the context of abortion provision and postabortion care. Substantial amounts of time and effort were invested to identify the best informed experts, who were selected on the basis of their professional affiliation, training, experience and expertise on the topic. In all, 102 knowledgeable professionals were selected and interviewed. The respondents were from four of the country's five major regions. Although almost all of them worked in urban areas, many had experience working in rural areas. Most of the respondents (75%) were medical professionals; the rest were nonmedical health professionals who offered a broad community-based

perspective, different from and complementing the medical perspective of providers who work in health facilities. In contrast to HFS respondents, who need to know only what is happening in their facility, HPS respondents are required to have broader knowledge about abortion provision and complications, both inside and outside facilities.

KOCH AND COLLEAGUES' ALTERNATIVES TO THE AICM

Koch et al. correctly recognize that a direct count of abortion is not possible where the procedure is performed clandestinely. However, the estimation methodology they propose uses incorrect assumptions that lead to erroneous findings and wrong conclusions, including the claim that the AICM overestimates induced abortions and abortion morbidity.

According to Koch et al., it is possible to estimate number of induced abortions and the number of hospitalizations for complications from induced abortion by using demographic indicators based on "real vital events" or "standard rates from known populations." The first fallacy of their argument lies in their supposition that high-quality data from one population apply to other populations without any modification, and that applying such measures to a different population will generate reliable estimates for that population. This is not the case for any demographic measure, as such measures are influenced by many country-specific factors; it is especially erroneous with regard to abortion in settings where the procedure is illegal and stigmatized, and occurs clandestinely.

The approach described by Koch et al., which they claim is a valid, objective and replicable epidemiological method, consists of two components: estimating the number of women hospitalized for complications of induced abortion and estimating the total number of induced abortions. However, both components are seriously flawed.

Estimating the Number of Women Hospitalized For Induced Abortion Complications

Hospital records in Colombia are not of good enough quality to be used to estimate the number of women treated for induced and spontaneous abortion complications in health facilities. According to Koch et al., Chile has good hospital data and is an appropriate population to be used as a standard for these estimates. Thus, they base their estimates on the following "real data": hospital data on the number of women treated for induced abortion complications in Chile, the number of children born alive in Chile and the number of children born alive in Colombia. They calculate the ratio of hospitalizations for postabortion care per 1,000 live births in Chile and apply this ratio to the number of live births in Colombia to generate the number of women hospitalized for abortion complications in Colombia.

On the basis of one study in the United States,[20] Koch and colleagues assume that 33% of all pregnancies end in spontaneous or induced abortion. Thus, to estimate the total number of conceptions, they divide the total number of live births by 0.66 (the complement of 33%).

To estimate the total number of spontaneous abortions that occur at six or more weeks' gestation, Koch et al. multiply the estimated number of conceptions by 8%, the risk of spontaneous abortion at six or more weeks they obtained from one study.[20]

They then subtract their estimated number of spontaneous abortions at six or more weeks' gestation from the total number of women who received any type of postabortion care. The difference, according to Koch et al., is their estimated number of women hospitalized for complications from induced abortions.

●***The problems with this approach.*** Four major erroneous assumptions underlie the procedure described above and invalidate the whole exercise.

First, Koch et al. assume that every woman who has a spontaneous abortion at six or more weeks' gestation requires hospitalization. According to international recommendations on abortion care (both induced and spontaneous), however, spontaneous abortions in the first trimester typically do not require hospitalization.[21,22] Women with first-trimester spontaneous pregnancy losses may need treatment of the type typically available at a primary care facility, including manual examination and antibiotics; some may require a procedure (manual vacuum aspiration or medication abortion) if the products of conception are not fully expelled. In the case of second-trimester spontaneous (and induced) abortions, however, WHO recognizes that a dilation and curettage may be required, and this may be provided at a hospital or clinic. Worldwide, there is very little hard evidence on the extent to which women obtain treatment for spontaneous abortion or the level of facility or provider from which care is obtained. However, evidence for the United States, a country with good-quality data and widespread access to health services, provides some relevant information. Using national hospital discharge data on the number of U.S. women treated in hospitals for any diagnoses related to miscarriage[23,24] we calculated that the ratio of hospitalizations for treatment of miscarriage to total births is two per 100. An analysis that synthesized the body of clinical studies (most from Europe and the United States) on the incidence of spontaneous abortion estimated that 20 spontaneous pregnancy losses occur per 100 births;[*] for spontaneous pregnancy losses up to week 22 (the gestational period during which WHO classifies a loss as an abortion), the ratio is approximately 18 per 100.[25] A large study with more detailed data provides a more exact, confirmatory estimate for weeks 6–22 of 16 for 100 births.[26] Applying the hospitalization ratio to the incidence estimates suggests that in the United States, where access to care is very high, between one in eight and one in nine women having spontaneous abortions up to 22 weeks are treated in hospitals.

In the absence of data specific to countries in the developing world, and on the basis of the WHO guidance mentioned above, the AICM uses the information from clinical studies on the ratio of spontaneous abortions occurring in the second trimester to births (3.4 per 100[†]) to estimate the number of women treated for spontaneous pregnancy loss in hospitals; it subtracts this number from the total number treated in hospitals to obtain the number of women treated for induced abortion. In summary, international

[*] From the lowest gestation measured by clinical studies (4–6 weeks since the last menstrual period) to full-term (week 40).

[†]One large-scale U.S. study provides detail by single weeks of gestation, and allows us to measure the proportion of spontaneous abortions that occur from week 13 to week 22.[26]

recommendations for spontaneous abortion care and evidence from the United States support the AICM approach for indirectly estimating the number of women treated for spontaneous abortion complications in hospitals and health facilities, and make clear that the assumption by Koch et al. that all spontaneous abortions will be treated in hospitals greatly overestimates the number that will actually do so.

Second, Koch et al. assume that every woman experiencing a spontaneous abortion will be treated at a hospital. For many reasons, this is typically not the case. For example, there may be no hospitals where a woman lives, a woman and her family might not be able to afford the cost of treatment, a woman may obtain treatment from a provider who is not hospital-based, or a woman may not have symptoms that require medical treatment. By assuming that all women having spontaneous abortions after six weeks of pregnancy need and receive treatment in hospitals, Koch et al. effectively inflate the number of spontaneous abortions presented in health facilities and, as a result, underestimate the number of women treated for complications from induced abortions.

Third, Koch et al. also assume that every induced abortion complication that requires treatment will be treated at a hospital. It is clear that the authors do not understand the context in which abortion occurs in countries where the procedure is illegal. Some women with induced abortion complications may not seek hospital care for some of the same reasons that women with spontaneous abortions complications may not do so (poor access to providers, cost and reliance on providers in private practice). In addition, some may not seek care because of the stigma and shame that surround clandestine abortions. Because of all of these factors, only a proportion of women with induced abortion complications needing treatment will obtain it in hospitals, and the total number of women experiencing complications from induced abortion would be much greater than the number obtaining hospital treatment.

Fourth, when Koch et al. apply the Chilean data, as the so-called standard, to Colombia, they assume that Chile and Colombia are identical or similar in several respects:

- They assume that the two countries' health systems offer the same coverage, quality and distribution of health facilities by level, as well as geographic distribution of health facilities.
- They assume that women in both countries will react the same way to having an induced or a spontaneous abortion, and will be equally likely to seek treatment at hospitals. This further assumes comparability in factors that may affect a woman's willingness or ability to seek treatment for abortion complications, including access to hospital-based medical care, cultural and socioeconomic characteristics, and stigma associated with induced abortion.
- They assume that the proportion of abortions carried out by untrained providers (which can lead to abortion complications) is the same in both countries.

Chile and Colombia, however, differ in many ways. Two well-known basic differences are with respect to health coverage and women's educational attainment. Chile has almost twice the number of hospital beds per 10,000 population as Colombia (23 vs. 12).[27] It also has higher proportions of the population with secondary-level education (83% vs. 74%) and tertiary-level education (59% vs. 39%).[28]

The AICM bases its estimates on country-specific data from the HFS and HPS, and does not assume that data from one country can be applied to another.

●***Testing Koch and colleagues' approach.*** The flaws of the approach of Koch et al. can be further illustrated by using evidence from countries with good hospital records: Brazil and Mexico, for example.

We applied the Chilean data to these two countries in the same way that Koch et al. applied them to Colombia to obtain the number of women hospitalized for any abortion-related complications; that is, we multiplied the ratio of hospitalizations for postabortion care to live births in Chile by the number of live births in Brazil and Mexico. The resulting estimates of the number of women hospitalized for all abortion complications are, respectively, 99% and 38% higher than the real numbers obtained from hospital records. Likewise, the estimated numbers of women treated in hospitals for complications of spontaneous abortion alone using the approach proposed by Koch et al. are higher than the recorded numbers of women hospitalized for any abortion complications: 78% higher for Brazil and 23% higher for Mexico.

In summary, the weakness of the assumptions on which the approach proposed by Koch et al. is based is demonstrated by the exercise of applying it to Brazil and Mexico. The results of this test prove that Koch et al.'s approach to estimating the number of women hospitalized for induced abortion complications is erroneous. As a result, their claim—which is based on this approach—that the Guttmacher Institute's AICM overestimates the number of induced abortion complications, is also without basis.

Estimating the Total Number Of Induced Abortions

The way Koch et al. calculate the expected number of induced abortions in Colombia, and other Latin American countries, is clearly erroneous. They simply apply the abortion rate for Spain in 1987, the year abortion was legalized in that country, to the number of women of reproductive age in selected Latin American countries. Many factors influence abortion incidence in a country—for example, the level of contraceptive use, the prevalence of sexual activity among unmarried women and fertility preferences—and they vary greatly across countries and over time. However, Koch et al. do not provide any justification for their assumption that the abortion rate in one country can be applied to other countries.

●***The problems with this approach.*** Why would any Latin American country necessarily have the same abortion rate as Spain? Using the rate of Spain is as inappropriate as using the abortion rate of Italy, Ethiopia or Romania to generate the number of induced abortions in any country in Latin America. But to compare these so-called estimates of the number of induced abortions with the estimates obtained using the AICM is to do a great injustice to science.

Again, the approach of Koch et al. assumes that two countries—Spain and Colombia—are identical or similar in key ways in the time period compared. The authors argue that the legal status of abortion in Colombia in 2008 was similar to that in Spain in 1987. However, the two countries differ in many other important and relevant respects: Even in

1987, Spain was more developed than Colombia is today—it had a higher level of educational attainment, higher economic development and better access to health care. The per capita gross domestic product in Spain in 1987 was $8,011[28] (in current U.S. dollars); in Colombia in 2008, it was $5,435.[28] The rate of under-five mortality in Spain in 1990 (the earliest year for which data are available) was nine per 1,000 live births;[29] in Colombia in 2008, it was 20 per 1,000.[29] And the number of hospital beds per 10,000 people in Spain in 1991 was almost four times that in Colombia in 2008 (46[30] vs. 12[27]). Additionally, the two countries have different public policies: Spain has provided free and compulsory education since 1978[31] and universal health coverage since 1986,[30,32] while Colombia provides neither. Spain also had more liberal community attitudes in 1987 than Colombia had in 2008, and the two countries differed with respect to patterns of family building and contraceptive use, as well as family size preferences.

●***Failure of Koch and colleagues' approach for Mexico City.*** Koch et al. also address the case of Mexico and Mexico City, and conflate Guttmacher's estimate of the total number of abortions in Mexico with the number of legal abortions recorded in Mexico City, which is based on government statistics for services provided by public-sector facilities alone. Koch et al. report, on the basis of an unofficial report, that 16,945 legal abortions occurred in Mexico City in 2010. This number is close to the officially reported count of terminations performed by the city's Ministry of Health in 2009 (16,475).[33] However, they then interpret this number to represent all abortions in Mexico and point out that it is only a fraction of the number that Guttmacher estimated for 2006 (725,070–1,024,424).

To appreciate the extent of this mistake, it is important to understand some background. Abortion laws in Mexico are determined by state governments (not the federal government) and are highly restrictive in most of the country. The exception is Mexico City, where first-trimester pregnancy termination was decriminalized in 2007. Women in all other states (who make up 93% of all women of reproductive age in the country) still need to resort to illegal and often unsafe abortion. As a result, the prevalence of illegal induced abortion continues to be high throughout the country. In addition, women from other states seldom travel to Mexico City for legal pregnancy terminations; official government statistics indicate that only 3% of all women having terminations in Mexico City live outside the greater metropolitan area (which extends into the neighboring Estado de Mexico). In addition, there likely continue to be high levels of private and legal, but unrecorded, procedures and unsafe abortions in Mexico City because of issues related to stigma, ignorance of the law and inadequate access to safe legal services; implementation of a change in abortion law can take a substantial period of time.[34] Koch et al. ignore or are unaware of these factors when they compare the number of legal pregnancy terminations provided by the public sector in Mexico City with the total number of induced abortions nationwide estimated by Guttmacher. Doing so is incorrect and highly misleading.

To provide a further example of the inaccuracy of the approach proposed by Koch et al., we used it to estimate the number of induced abortions in Mexico City. Following this approach, we applied Spain's official rate of induced abortion (2.02 per 1,000 women of reproductive age for 1987) to the total number of women of reproductive age in Mexico City (2,296,028 in 2006), producing an estimate of 4,638 induced abortions in Mexico

City. However, 4,638 is only 28% of the number of officially reported public-sector procedures in Mexico City (16,475 in 2009 and 16,945 in 2010), a number that Koch et al. themselves acknowledge. Moreover, abortions provided by public-sector facilities are only one component of all abortions occurring in Mexico City: They do not include any of the large number of legal abortions provided in the private sector or unsafe abortions that continue to take place in Mexico City.[‡,8,35] The illogical result of this application of the Koch et al. approach further demonstrates how inaccurate and untenable it is.

CONCLUSION

In sum, Koch et al. fail in both their attempt to discredit the AICM and their attempt to present a credible alternative for estimating abortion incidence in countries where the procedure is highly restricted. Their approach is simplistic, highly misleading and simply wrong. Its underlying assumptions have no scientific basis and show no respect for contexts, a significant problem. Their erroneous procedures and assumptions have led Koch et al. to inaccurate results and to an unfounded attack on the Guttmacher Institute's AICM.

In sharp contrast, the AICM bases its estimates on original, country-specific data and has provided consistently reliable estimates of abortion incidence and treatment for complications in health facilities and hospitals. It follows a rigorous scientific and realistic approach. Furthermore, studies using the AICM have been conducted in several countries, peer-reviewed by experts multiple times (that is, each study has undergone peer review) and published in a number of journals.[2,3,5-8,36] These findings and approaches have also been used by international organizations such as the World Health Organization.[9,10] There is no evidence that the alternative approach proposed by Koch et al. has been widely used or approved by the scientific community. Moreover, when independently tested (as described above), it produced erroneous results.

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‡At a minimum, an estimated 16,459 women were treated in public-sector hospitals for complications of induced abortion in Mexico City in 2006.[8,35] In addition, the HPS conducted in Mexico in 2006 estimated that one in 10 women having induced abortions in Mexico City were hospitalized in public-sector hospitals for treatment of complications, indicating that the remaining nine in 10 had no complications or had complications but did not obtain care at public hospitals.[8]

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