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One component of the mortality impact of a total US abortion ban: a research note on the mortality consequence of denying all wanted induced abortions

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Abstract

In this research note, I estimate one component of the mortality impact of denying all wanted induced abortions in the U.S. This estimate quantifies the magnitude of an increase in pregnancy-related death which would occur solely due to the greater mortality risk of continuing pregnancy to term compared to underdoing legal induced abortion. Using published statistics on pregnancy-related mortality ratios, births, and abortions, I estimate U.S. pregnancy-related deaths by race-ethnicity before and in the first and subsequent years of a total abortion ban. I estimate deaths after a total abortion ban by assuming that all induced abortions are denied, assuming that each abortion denied averts 0.8 births, and increasing exposure to pregnancy-related mortality accordingly. I find that in the first year of ban, estimated pregnancy-related deaths would increase from 675 to 724 (49 additional deaths, 7% increase), and in subsequent years to 815 (140 additional deaths, 21% increase). Non-Hispanic Black women would experience the greatest increase in deaths (33% increase in subsequent years). Estimated pregnancy-related deaths would increase for all race/ethnicities examined. Denying all wanted induced abortions in US would increase pregnancy-related mortality substantially, even if unsafe abortion does not increase.

Introduction

Recent proposed and enacted laws in the U.S. have banned abortion as early as six weeks of pregnancy (before most women know they are pregnant). These laws, coupled with a rightward shift in the U.S. Supreme Court heighten the need to estimate the mortality benefits of legal induced abortion in the U.S. (Nash, 2019). Popular attention focuses on anticipated increases in potentially unsafe abortion outside the clinical context and resulting pregnancy-related deaths, but the mortality burden of a total or near total abortion ban would also include additional pregnancy-related mortality due to the fact that childbirth in the U.S. carries substantially greater mortality risk than does legal induced abortion (Raymond & Grimes, 2012). Thus, policies that end or radically curtail the legal provision of abortion care could increase pregnancy-related deaths simply by increasing the number of women who are exposed to the risks of carrying a pregnancy to term because their wanted abortions are denied. In this research note, I provide a set of assumptions and estimates to describe how denying all wanted U.S. abortions would increase exposure to risk of pregnancy-related death by causing more pregnancies to be carried to term. Then I estimate how this increase in exposure could impact the annual number of additional pregnancy-related deaths by race/ethnic group in the first and subsequent years of all wanted legal abortions being denied.

No U.S. state has enforced a total or near total abortion ban for more than a few weeks(White et al., 2021) in recent decades, so the mortality impact of totally banning abortion cannot be measured directly. And inference from historical evidence is of limited salience because pregnancy-related mortality before *Roe v. Wade* legalized abortion nationwide was largely due to unsafe abortion (Cates Jr et al., 1978; Cates & Rochat, 1976), the prevalence of which would likely be different under a contemporary total ban. This prevalence is particularly difficult to project because of recent advances in self-managed medication abortion (Aiken et al., 2017). If abortion is totally banned, people seeking abortion outside clinical contexts could be served by organizations already supporting safer self-managed medication abortion in U.S. states where abortion access is restricted,(Aiken et al., 2020) making a large increase in pregnancy-related mortality due to unsafe abortion less likely. Furthermore, the most recent investigations have found that unsafe abortion methods and effective self-induction methods are uncommon among women reporting self-induced abortion outside the clinical context (Grossman et al., 2010). Additional mortality due to unsafe abortion under a possible total ban is unknown and unlikely to be similar to that pre-*Roe*.

However, published statistics on the numbers of induced abortions currently received in the U.S. make it possible to estimate the additional number of pregnancies which would be carried to term if all abortions were denied. Applying published pregnancy-related mortality ratios to these additional pregnancies carried to term and subtracting the lower mortality risk of the legal induced abortions denied, it is possible to estimate part of the mortality consequence of totally banning induced abortion. Any increases in pregnancy-related mortality under a total abortion ban due to potentially unsafe abortion would be in addition to this estimate. And if access to effective self-managed medication abortion radically expands (which it is important to note is currently illegal), some pregnancies would be terminated and thus the estimates here may be too high. I estimate this component separately for the first and subsequent years of a new abortion ban, highlighting that the full impact on pregnancy-related mortality of a total abortion ban will likely not be observed in the first year of effect.

Methods

Relying on the most recent published statistics for U.S. pregnancy-related mortality for pregnancies ending in birth and induced abortion, population-level births, and estimated abortions, I estimate annual pregnancy-related deaths by race-/ethnicity under three conditions: at baseline, during the first year of a total abortion ban beginning January 1, and during subsequent years after a ban.

In the first year in which all wanted induced abortions are denied, some additional pregnancy-related deaths will not occur until following year. Induced abortion (and thus abortion denial) commonly occurs early in pregnancy but the majority of pregnancy-related mortality risk occurs late in pregnancy. Therefore, I estimate additional pregnancy-related deaths separately for first and subsequent years. After the first year, assuming no changes in population, the deaths from abortions denied in the prior year would balance the deaths occurring in the subsequent year.

I generate all estimates below for race/ethnic groups whose counts of abortions may be estimated from published statistics: non-Hispanic white, non-Hispanic Black, Hispanic, and other non-Hispanic women. Pregnancy-related mortality ratios are available for births to non-Hispanic white, non-Hispanic Black, and Hispanic people but not for the remainder category of births to all other non-Hispanic people. Therefore, I apply the overall pregnancy-related mortality ratio to this group.

I use births and abortions from 2017 and pregnancy-related mortality ratios (PRMRs) from 2014–2017 to represent conditions at baseline because this the most recent year for which a national estimate of the number of abortions is available and the latest time period for which PRMRs are available by race/ethnicity.

I estimate pregnancy-related deaths in 2017 based on 2017 births by race/ethnicity and PRMRs by race/ethnicity for the period 2014–2017.(Division of Reproductive Health, 2020; Martin et al., 2018) This provides an estimated baseline level of pregnancy-related mortality before a total ban.

The most complete statistics on abortion service delivery in the United States come from the Guttmacher Institute, so I rely on their most recent published estimates. Since only total abortions are available for the most recent year with data (2017), I use their estimates of 2014 abortions by race/ethnicity and their estimate of 2017 total abortions.(Jones et al., 2019; Jones & Jerman, 2017b) The total estimated number of abortions in 2017 is 7% fewer than the total estimated number in 2014. Therefore, I reduce the estimated number of 2014 abortions received by women in each race/ethnicity by 7% to estimate 2017 abortions by race/ethnicity. These represent the numbers of abortions received at baseline and the numbers which would be denied if induced abortion were totally banned in the U.S.

In order to estimate pregnancy-related deaths if all abortions were denied, I must estimate the fraction of abortions denied which would end in additional births. For the first year of a ban, I must also estimate the fraction of additional pregnancy-related deaths which would occur in the same calendar year as abortion denial. I begin by assuming each abortion denied averts 0.8 births (a number less than 1 because of miscarriage and return of fecundability).(Potter, 1972) In order to estimate the number of additional deaths due to abortion denials in the first year of a total abortion ban, I estimate the fraction of additional pregnancy-related deaths which would occur in the same calendar year as the denied abortion. I begin by assuming a uniform distribution of abortions across calendar months and that all terminations occur at 8 weeks gestation, the modal gestational age of abortion in the U.S. (Jones & Jerman, 2017b). Based on these assumptions, I calculate the fraction of pregnancy-related deaths associated with abortions denied in each calendar month which would occur in the same calendar year, based on published fractions of pregnancy-related deaths by timing relative to delivery. I estimate 42% of pregnancies ending in abortion in condition A would reach 40 weeks' gestation during the same year in condition B (all abortions denied in May or earlier . 42 = 5/12). Following published statistics regarding the timing of pregnancy-related deaths with respect to delivery,(Petersen et al., 2019) I estimate that 83% of deaths associated with these 42% of pregnancies would occur in the same calendar year.[1] Following a similar approach, I estimate 5% of the deaths associated with the 58% of pregnancies continued after abortion denials in June or later would occur in the same year.[2] Thus, to estimate the impact of denying all abortions in the first year of the ban, I estimate deaths for each race/ethnicity group as if counts of births increased by 30% of estimated abortions denied in the first year of total ban . 30 = 0.8 × (0.42 × 0.83 + 0.58 × 0.05) and as if counts of births increased by 80% of estimated abortions in subsequent years of a total ban.

Since PRMR include any mortality due to induced abortion in the numerator but not the denominator, I apply published pregnancy-related mortality ratios for pregnancies ending in induced abortion(Raymond & Grimes, 2012) to estimated abortions by race/ethnicity in 2017 and subtract the resulting estimates from the estimated deaths for each race/ethnicity in both the first year of a ban and subsequent years of a ban.

The difference in pregnancy-related deaths estimated for the 2017 baseline and for the first and subsequent years of a ban is an estimate of the additional pregnancy-related mortality resulting from denying all wanted induced abortion in the US, assuming no additional mortality associated with unsafe terminations and assuming all pregnancies are continued because of abortion denial.

To compare estimated levels of pregnancy-related death before and after an abortion ban across groups while capturing the contribution of level of fertility and population size, I estimate the probability that a 15 year old will die from a pregnancy-related cause if the prevailing fertility and pregnancy-related mortality rates continue for her reproductive life, assuming negligible mortality before age 50.(Wilmoth, 2009) To estimate this probability at the 2017 baseline before all abortions are denied, I calculate the probability for each race/ethnic group r such that the probability is 1 in $\frac{100000}{(TFR_{2017,r})(PRMR_r)}$.

To estimate the probability after all wanted induced abortions are denied (for subsequent years), I begin by estimating $\mathrm{TFR}_{post,r}$ as the product of the TFR for race/ethnicity r in 2017 and that race/ethnicity's ratio of estimated births after all wanted induced abortions are denied and births in 2017:

[1]This estimate is the result of distributing deaths over time based on when abortions denied would reach term. It includes all deaths during pregnancy (31.3% of pregnancy-related deaths), all deaths on the day of delivery (16.9% of pregnancy-related deaths), all deaths 1–6 days postpartum (18.6% of pregnancy-related deaths), most deaths 7–24 days postpartum (21.4% of pregnancy related deaths – note that only for abortions denied in December would some of these deaths would occur in the next year), and a very small fraction of deaths 43–365 days postpartum (11.7% of deaths – note that even for abortions denied early in the year an overwhelming majority of these deaths would occur in the next year, since these pregnancies would not reach term until late in the first year).

[2]For these pregnancies – which would not reach term during the first year – I assume for simplicity that pregnancy-related deaths during pregnancy occur with a uniform distribution across months of pregnancy and for each month calculate the fraction of the 9 months of pregnancy which would occur in the first year of a ban. I apply these percentages to the 31.3% of pregnancy related deaths occurring during pregnancy over the first year to generate the fraction of additional pregnancy-related deaths associated with these pregnancies which would occur in the first year of a ban.

$$TFR_{post,r} = TFR_{2017,r}\left(\frac{Births_{2017,r} + 0.8(Abortions\ denied_r)}{Births_{2017,r}}\right)$$

Where $TFR_{2017,r}$ is the published total fertility rate for race/ethnic group r in 2017, $Births_{2017,r}$ the published number of births for race/ethnic group r in 2017, and $Abortions\ denied_r$ is the estimated number of abortions in race/ethnic group r in 2017. Then the risk of death is 1 in $\frac{100{,}000}{(TFR_{post,r})(PRMR_r)}$.

This study was determined not human subjects research by an Institutional Review Board.

Results

In the first year in which all wanted induced abortions in the U.S. are denied, the estimated annual number of pregnancy-related deaths would increase from 675 to 724 (49 additional deaths, 7% increase), and in subsequent years to 815 (140 additional deaths, 21% increase). Non-Hispanic Black people would experience the greatest increase in deaths (33% increase in subsequent years), but estimated pregnancy-related deaths would increase for all race/ethnicities (see Table). Because the estimated deaths before and after a ban are based on the same population and fertility rates, percentage increases also reflect increases in the annual risk of dying from pregnancy-related causes.

In terms of risk of dying from pregnancy related causes, denying all wanted induced abortion would be associated with an increase in risk from 1 in 3300 to 1 in 2800 among all women. Among non-Hispanic Black women, the increase in risk would be from 1 in 1300 to 1 in 1000.

Conclusion

Annual pregnancy-related deaths in the U.S. are estimated to increase if all wanted legal induced abortions are denied, even if women denied legal access to abortion do not resort to unsafe procedures. Both in terms of the number of additional deaths and in terms of the increase in risk, the additional mortality burden associated with an abortion ban is estimated to be greatest among non-Hispanic Black women, raising important health equity concerns. Black women already experience high levels of pregnancy-related mortality, so exposing more Black women to this risk because their wanted abortions are denied will exacerbate the disproportionate impact felt by this population.

The mortality impact of denying all wanted induced abortions could also be smaller than estimated here if large numbers of people denied abortion turn to effective protocols for self-managed abortion and thus successfully terminate their own pregnancies, though recent evidence indicates that very small fractions of women seeking to self-induce or self-manage abortion do so, even in restrictive states.(Aiken et al., 2020; Grossman et al., 2010) Impacts could be larger if reliance on unsafe abortion methods increases after a total ban or if pregnancy-related mortality ratios increase. This analysis is limited by my reliance on abortion rates from 2014 and 2017, the most recent years available. If declines in U.S.

abortion rates reflect declining unwanted pregnancies and this trend continues,(Jones & Jerman, 2017b) impacts could be smaller. Abortion incidence and rates have been declining since the 1990s, and recent years have seen these declines concentrated among young women, women of color, and women with higher family incomes.(Jones & Jerman, 2017b) These populations include women with various levels of pregnancy-related mortality risk, making it difficult to predict the degree to which declines in abortion overall have or will leave a population of current abortion-seekers whose potential abortion denials would leave them at higher or lower risk of pregnancy related mortality. However, applying prevailing pregnancy-related mortality ratios to pregnancies currently ending in abortion is conservative insofar as women who receive abortion have higher prevalence of factors associated with elevated risk of pregnancy-related mortality compared to women who carry to term.(Jones & Jerman, 2017b; Raymond & Grimes, 2012). And allowing each abortion denied to contribute only a fraction of a birth to the hypothetical number of births if all abortions are denied is also conservative.(Potter, 1972) The results presented here use demographic indirect estimation methods to estimate the consequence of banning induced abortion for pregnancy related mortality. They do not reflect actual counts of pregnancy-related deaths.

The logic underlying these results applies to proposed state-level abortion bans, though data constraints could limit state-level estimation.

Proposed legislation sometimes – though not always – includes exceptions under which abortions are not denied to victims of rape or incest or if abortion is required to save the pregnant person’s life. It is important to note that such exceptions often carry stringent reporting and documentation requirements for the pregnant person and the physician and thus may be very rarely utilized. Therefore, near-total bans on abortion may function similarly to total bans.

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Table.

Estimated annual pregnancy-related deaths in the U.S. before and after a hypothetical ban on induced abortion, assuming zero increase in unsafe abortion.

Race/ ethnic group	A. PRMR 2014–2017, per 100,000 births[a]	B. Number of births, 2017[b]	C. Number of estimated deaths before ban[c]	D. Number of estimated abortions before ban (denied after ban)[d]	E. Additional deaths, first year of ban[e] (N, % increase)		F. Additional deaths, later years of ban[f] (N, % increase)		G. Before ban, annual rate expressed as lifetime risk[g]	H. Later years of ban, annual rate expressed as lifetime risk[h]
NH White	13.4	1,992,461	267	334,060	11	4%	33	13%	1 in 4,500	1 in 3,900
NH Black	41.7	560,715	234	238,000	28	12%	78	33%	1 in 1,300	1 in 1,000
Hispanic	11.6	898,764	104	213,940	6	6%	18	18%	1 in 4,300	1 in 3,600
NH other	17.3	403,560	70	76,310	3	5%	10	14%		
Total	17.3	3,855,500	675	862,300	49	7%	140	21%	1 in 3,300	1 in 2,800

Notes

[a] National pregnancy-related mortality ratios by race-ethnic group 2014–2017.(Division of Reproductive Health, 2020) Note that the PRMR for the non-Hispanic other category is the overall PRMR because the compositions of the births and abortions in this category do not align with the subgroups for which PRMRs are available.

[b] Published total births by race/ethnic group. Non-Hispanic other includes all births to individuals who were not identified as non-Hispanic white, non-Hispanic Black, or Hispanic of any race. This partitioning of births by race/ethnicity was selected because it was the most precise one for which annual abortions may be estimated based on published estimated totals.

[c] Estimated pregnancy-related deaths before a ban, calculated as $\frac{(Births_r)(PRMR_r)}{100{,}000}$ using births from Column B and PRMR from Column A. Rounded to the nearest whole number. Note that the Total in this column is the sum of deaths from all race/ethnic groups.

[d] Estimated abortions in 2017 calculated as 93% of estimated abortions by race/ethnic group from 2014 (Jones & Jerman, 2017a) (most recent year for which race/ethnic group-specific estimates of counts or rates of abortions are available) and total estimated abortions from 2017 (Jones et al., 2019). Assumes declines do not vary across groups. Rounded to the nearest 10.

[e] Estimated as follows for each race/ethnic group (r):

$$\frac{0.3(Abortions\ denied_r)(PRMR_r)}{100{,}000} - \frac{(Abortions\ denied_r)(0.7)}{100{,}000}$$

Where abortions denied are the estimated abortions before a ban from Column D and 0.7 represents estimated mortality related to pregnancies ending in induced abortion in the U.S. (Raymond & Grimes, 2012)

[f] Calculated as above, but using 0.8 instead of 0.3, since each abortion denied is estimated to yield 0.8 of a birth in subsequent years.

[g] Estimated probability that a 15 year old will die from a pregnancy-related cause if the prevailing fertility and pregnancy-related mortality ratios continue for her reproductive life, assuming negligible mortality before age 50. Estimated for each race/ethnic group (r) by: $\frac{100000}{(TFR_{2017}, r)(PRMR_r)}$. Rounded to nearest 1 in 100.

[h] Estimated probability that a 15 year old would die from a pregnancy-related cause if current pregnancy-related mortality ratios continue for her reproductive life and prevailing fertility rates in her race/ethnic group increased due to all induced abortions being denied, such that the total fertility rate for her race/ethnic group became:

$$TFR_{post,r} = TFR_{2017,r}\left(\frac{Births_{2017,r} + 0.8(Abortions\ denied_r)}{Births_{2017,r}}\right)$$

Where $TFR_{pre,r}$ is the published total fertility rate for race/ethnic group r in 2017, $Births_{pre,r}$ the published number of births for race/ethnic group r in 2017, and $Abortions\ denied_r$ is the same as the estimated number of abortions in race/ethnic group r in 2017. Then the risk of death is 1 in $\frac{100{,}000}{(TFR_{post,r})(PRMR_r)}$ (rounded to nearest 1 in 100).