

Maternal morbidity under an absolute abortion ban: insights from a 6-year case series of fatal fetal malformations in El Salvador



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BACKGROUND: A striking number of national and subnational governments that previously allowed legal abortion in cases of severe fetal anomaly have passed new legislation to explicitly remove these allowances. However, we know little about the maternal health implications of such restrictions.

OBJECTIVE: This study aimed to examine the health outcomes of pregnant individuals in El Salvador whose fetuses were diagnosed with a fatal congenital malformation and who were legally required to carry these nonviable pregnancies to term under the nation's absolute abortion ban.

STUDY DESIGN: We reviewed the charts of all 239 pregnancies with fetuses classified as having 1 of 18 congenital malformations typically considered to be incompatible with extrauterine life that were evaluated at the National Women's Hospital in El Salvador between January 1, 2013 and December 31, 2018. Because regional healthcare providers who identify pregnancy complications in El Salvador are instructed to refer those patients to the National Women's Hospital, our analysis captured the total population of lethal fetal malformations treated by the national public health system. We documented pregnant patients' socioeconomic characteristics, pregnancy-related complications, and the medical procedures used to mitigate complications.

RESULTS: Individuals who were required to carry pregnancies with severe fetal malformations to term (or until preterm labor began naturally) experienced high rates of maternal morbidity. More than half (54.9%) of pregnancies experienced at least 1 serious pregnancy-related health complication, whereas 47.9% underwent a physically-invasive medical procedure to manage complications, including cesarean deliveries, decompression amniocenteses, fetal head decompressions, and, in 1 case, a full hysterectomy. A total of 9% of patients opted to discontinue care after receiving the diagnosis of fatal fetal malformation. We also found striking variation in how physicians managed pregnancies with fatal fetal malformations, suggesting that different interpretations of the law lead to inequities in individual-level patient care.

CONCLUSION: Laws prohibiting abortions in cases of severe fetal malformation can increase risks to pregnant patients by requiring clinicians to subject healthy patients to a course of treatment that generates morbidity.

Key words: abortion, Central America, El Salvador, fetal anomaly, fetal malformation, health policy, Latin America, legislation, maternal morbidity

Introduction

Concerns about fetal anomaly have recently gained salience in abortion debates around the world, and a striking number of national and subnational governments that previously allowed legal abortion in cases of severe fetal anomaly have passed new legislation to explicitly remove these allowances.^{1–5} However, we know little about the maternal health implications of such

restrictions. Researchers that studied severe fetal malformations typically focused on how malformation is diagnosed,^{6–8} how it affects the fetus,^{9,10} and how pregnant people make decisions about whether to continue the pregnancy.^{11,12} Some studies mentioned how specific fatal fetal malformations may increase specific health risks for pregnant individuals, but these mentions are seldomly supported with

systematic data.¹³ No study has yet examined the cohort-level health implications of legal prohibitions on the termination of pregnancies for reasons of severe fetal malformation.

To address this research gap, we examined the extent and type of maternal health complications that occur among pregnancies diagnosed with fatal fetal malformations in El Salvador where it is illegal to terminate any

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AJOG Global Reports at a Glance

Why was this study conducted?

This study aimed to examine the maternal health outcomes of pregnant individuals in El Salvador whose fetuses were diagnosed with a fatal congenital malformation and who were legally required to carry these nonviable pregnancies to term.

Key findings

Patients who were required to carry pregnancies with severe fetal malformations experienced high rates of maternal morbidity; 54.9% of pregnancies in our study experienced at least 1 serious pregnancy-related health complication, and 47.9% underwent a physically-invasive medical procedure.

What does this add to what is known?

Existing research documents how abortion prohibitions increase maternal morbidity by increasing the number of pregnant people who undergo unsafe abortions. Our descriptive study of a case series demonstrates that abortion prohibitions also increase negative health outcomes by requiring individuals to carry complicated pregnancies to term.

pregnancy, regardless of maternal health or fetal viability.

Materials and Methods**The case**

El Salvador provides a unique opportunity to analyze the relationship between fatal fetal anomalies and pregnancy health under an absolute abortion ban. Since 1998, El Salvador's penal code has prohibited all abortion for any reason, and physicians working in the Salvadoran public health system are instructed to follow the law or face legal sanctions.¹⁴ Moreover, because El Salvador is geographically small, regional healthcare providers are instructed to refer all patients with pregnancy complications to the National Women's Hospital (NWH) where the public health system concentrates its expertise and evaluative equipment. Data from the NWH should therefore capture the entire population of fatal fetal malformations treated in the Salvadoran public health system.

Data collection and analysis

Our objective was to find all pregnancies that were diagnosed with 1 of 18 types of malformations typically considered incompatible with life at the NWH between January 1, 2013 and December 31, 2018 (Table 1)^{15,16} and

then to document the type and extent of maternal health complications that occurred in each case. After receiving approval from the NWH Committee for Ethical Investigation on March 26, 2019, we requested the case numbers for all pregnancies that fit our criteria from the El Salvador Ministry of Health's Vital Statistics System. We cross-checked these numbers with the register of the hospital's Fetal Pathology Committee, and our expert on fetal malformations reviewed each case to ensure it met our inclusion criteria. We identified 239 pregnancies that met the criteria for inclusion. Because patient records were paper based, we reviewed each file from inside the hospital's records room (Figure 1) and out a data collection form for each pregnancy. Only the anonymized data collection forms were removed from the hospital.

We collected data about universal birth characteristics (eg, was the fetus delivered vaginally or by cesarean?) through close-ended questions on our data collection forms, and we recorded and reported missing data for these variables. We dropped 5 cases from our outcome analyses (Tables 3–7) because of missing data.

We collected data about birth complications and the clinicians' rationales

for prescribed treatments through open-ended questions on our data collection forms. If the patient file did not mention a complication or treatment, then we coded the patient as not having experienced that complication or treatment, because we had no way of distinguishing missing complication data from the absence of actual complications. As a consequence, any bias in our analysis skews toward underreporting the extent of complications and interventions.

The resulting data set allowed us to describe the type and extent of maternal health complications that occurred when a pregnancy was diagnosed with a fatal fetal anomaly in a context where preterm pregnancy interruption is strictly prohibited. In an ideal research scenario, we could complement this descriptive case series with a statistical assessment of the causal effect of El Salvador's abortion ban. This statistical assessment would require comparing our study population—pregnancies with fatal fetal malformations that could not legally be interrupted—with a control group of similar pregnancies and similar fatal fetal malformations that were given the opportunity to be interrupted. Unfortunately, such data do not exist in El Salvador because of the very legal context that we seek to assess. However, our research design does allow for counterfactual causal reasoning: we theorize that each of these complications could have been avoided if fetal malformation had been diagnosed early, and if patients had been given the option to interrupt their pregnancies at the moment of diagnosis.

Finally, to better assess whether the complication rates captured in our descriptive study are atypically high, we solicited national-level data on pregnancy complications from 2 government sources through the Salvadoran Law on Access to Public Information. We used these national-level statistics, in addition to published estimates from other countries, as general benchmarks for evaluating the magnitude of complication rates documented in our study population.

TABLE 1
Fetal diagnoses required for study inclusion and their distribution across the study population

Category	Key characteristics displayed by the fetus	n	%
Acrania, anencephaly, and exencephaly	Total or partial absence of the cranium, the skin that covers it, and brain matter, produced by a failure of the neural tube to close.	59	24.6
Hydranencephaly	The cerebral hemispheres are absent and substituted with sacs of cerebrospinal fluid.	12	5.0
Alobar holoprosencephaly	Absence of the front brain lobe.	30	12.5
Laryngeal atresia to tracheal atresia	Partial or complete absence of the trachea below the larynx.	1	0.4
Agnesis of the diaphragm	Absence of the diaphragm.	0	—
Bilateral renal agnesis	Absence of the kidneys.	11	4.6
Bilateral renal pathology with early onset Potter sequence	Obstruction and malformation of the urinary system.	61	25.4
Ectopia cordis (ectopic heart)	The heart forms outside the thorax.	0	—
Pentalogy of Cantrell	Severe defects in the formation of the diaphragm, the abdominal wall, the pericardium, the heart, and the sternum.	3	1.3
Amniotic band syndrome	Fibrous and sticky cords of the amnion that damage the face, arms, legs, fingers, and may compromise other organs.	2	0.8
Limb-body wall complex	Congenital disorder in numerous organs associated with a short umbilical cord that places the fetus close to the amnion wall and does not allow the closure of the abdominal wall, causing malformations in the extremities.	10	4.2
Lethal skeletal dysplasia with thoracic hypoplasia	Malformations of the thorax that cause asphyxiation.	2	0.8
Thanatophoric dysplasia (type I and type II)	Skeletal dysplasia with severe shortening of the extremities, large head, prominent forehead, and thoracic hypoplasia that cause asphyxiation.	4	1.7
Achondrogenesis (type I and type II)	Skeletal dysplasia with defect in bone mineralization, shortening of the extremities, large head, hypoplastic chest that is associated with asphyxia, nuchal edema, and polyhydramnios; may be associated with fractured ribs.	1	0.4
Osteogenesis imperfecta type II	Shortening of the extremities and the ribs, causing multiple fractures, with hypomineralization of the cranium.	1	0.4
Congenital hypophosphatasia	Bone mineralization disorder, with hypomineralization of the cranium and thin ribs, shortening of the extremities, spontaneous fractures, and thoracic hypoplasia.	0	—
Chromosomal diseases: trisomy 18, trisomy 13, trisomy 9, triploidy	An additional chromosome leads to a range of anomalies, including irregularities of the kidneys, ureter, heart, lungs, diaphragm; cleft palate; microcephaly; malformations of the head and feet; neural tube defects; malformations of the sex organs; structural defects of the eyes; liver and gall bladder defects; twisted intestines.	41	17.1
Acardiac acephalus	Twin reversed arterial perfusion syndrome, or TRAP. In monozygotic twins, 1 twin has an absent heart and receives its blood through the pumping of the normal heart of the other twin.	2	0.8
Total		240 ^a	100.0

Data are presented for 239 pregnancies.

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^a There were 9 cases of twins among the 239 pregnancies in this study. In 8 of those cases, one twin developed typically and the other had a lethal fetal malformation. In the remaining case, both twins had the same lethal fetal malformation. The above table therefore documents 240 lethal fetal malformations despite only having 239 pregnancies in our database.

Population characteristics

The population characteristics are presented in [Table 2](#). Because individuals

with financial resources in El Salvador typically access private healthcare, the public hospital patients in our study

were overwhelmingly poor and poorly educated; only 5% completed any post-high school education, and only 3.8%

FIG. 1
Collecting Data in the National Women's Hospital



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are employed in the formal sector. More than half (53.1%) of the pregnancies were to individuals aged 24 years or younger with 11.7% being to minors under the age of 18 years. Nearly 40% were first pregnancies, and three-quarters of the pregnancies were unplanned.

Our unit of analysis was the pregnancy. Two patients appeared in our data set more than once because they became pregnant twice (in the first case) or 3 times (in the second case) during our 6-year period of analysis, and each time, the fetus was diagnosed with a fatal malformation.

Results

We analyzed 3 categories of outcomes, namely (1) variability in patient care, (2) maternal health complications, and (3) interventions used to treat maternal health complications.

Variability in patient care

The variability in patient care is presented in [Table 3](#). Our study documented striking variation in clinical treatment, suggesting that physicians working within the same institution held disparate understandings about how to translate abortion laws into medical practice.

Early induction. In 10 cases, physicians defied legal expectations and induced labor in their patients before the pregnancy reached full term (37 weeks). Five of these cases were induced at the 35th or 36th week of pregnancy. The remaining 5 were induced between the 25th and 32nd weeks. The reasons given for early induction included avoiding obstructed labor (4 cases), mitigating kidney failure (1 case), avoiding the possibility of postpartum uterine atony and hemorrhage (1 case), and

management of polyhydramnios (1 case). In the remaining 3 cases, no reason was given although the patients' personal situations may have encouraged inductions; 1 was only 16 years old and another was threatening suicide.

No early induction—fetus treated as viable. In 21 cases, pregnant patients received treatments that were not necessary for their own health, but instead that were aimed at helping the fetus remain in utero long enough to “reach viability” and survive birth—a striking treatment decision given that the fetus had already been diagnosed with a fatal malformation and would never be viable. One patient was hospitalized and given tocolytics to halt preterm labor. Another was hospitalized for 8 days after her membranes broke and before a cesarean delivery was scheduled. Still, another underwent an amnioinfusion to

TABLE 2

Self-reported demographic characteristics of all pregnant patients diagnosed with fetal malformations incompatible with life at the National Women's Hospital in El Salvador from 2013 to 2018

Characteristics	n	%
Age cohort (y)		
15–24 ^a	127	53.1
25–34	79	33.1
35–44	31	13.0
≥45	2	0.8
Valid cases	239	100.0
Missing data	0	0.0
Education level^b		
No formal schooling	9	3.8
Some primary or completed primary (grades 1–5)	58	24.3
Some secondary or completed secondary (grades 6–8)	109	45.6
Some high school or completed high school (grades 9–12)	30	12.6
Some university or completed university degree	10	4.2
Some technical or completed technical degree	2	0.8
Valid cases	218	91.2
Missing data	21	8.8
Employment status^b		
Formally employed	9	3.8
Informally employed or self-employed	11	4.6
Engaged in unpaid household labor	203	84.9
Unemployed	3	1.3
Student	5	2.1
Valid cases	231	96.7
Missing data	8	3.3
Gravidity		
1	95	39.7
2	68	28.5
3	43	18.0
4	14	5.9
≥5	18	7.5
Valid cases	238	99.6
Missing data	1	0.4
Planned pregnancy		
No	178	74.5
Yes	38	15.9
Valid cases	216	90.4
Missing data	23	9.6

Data are presented for 239 pregnancies.

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^a This category includes 28 pregnant teens including four 15-year-olds, fourteen 16-year-olds, ten 17-year-olds, ten 18-year-olds, and twenty-one 19-year-olds; ^b The education and employment categories in this table reflect the categories used in the National Women's Hospital intake forms; no more specific data were available.

support fetal development, and in 8 cases, physicians performed emergency cesarean deliveries only because of explicit, documented concerns for “fetal distress” in the nonviable fetus. Clinicians in these cases seemed to interpret the Salvadoran anti-abortion law as requiring them to treat all fetuses as potentially viable, regardless of actual fetal viability.

The handling of breech pregnancies and fetuses with exposed soft tissue provides an important illustration of how some clinicians made treatment decisions that prioritized the health of nonviable fetuses over maternal health. In cases of poor prognosis for fetal life, medical protocols encourage vaginal delivery of breech fetuses or fetuses with exposed soft tissue as a safer alternative for the pregnant patient.¹⁷ Nevertheless, on 8 occasions, clinicians in our database explicitly ordered a cesarean delivery to protect a nonviable fetus with breech presentation or exposed soft tissue.

No early induction—fetus otherwise treated as nonviable. In 182 pregnancies, patients carried their pregnancies until the fetus died in utero, they went into labor naturally, or the pregnancy reached full term (typically 40+ weeks) and physicians initiated the delivery. Physicians in this category did not offer early inductions. However, if other treatment decisions were required during the pregnancy, they chose protocols that prioritized maternal wellbeing (or the wellbeing of a viable fetus in the case of twins), even if this protocol harmed the nonviable fetus. When preterm labor began, for example, physicians allowed it to evolve into preterm birth. In cases of breech positioning or soft tissue exposure, physicians opted for vaginal birth over cesarean deliveries, and in 4 cases of cephalopelvic disproportion, physicians facilitated vaginal delivery through fetal head decompression.

Discontinued care. In 21 cases (9.0% of pregnancies), the pregnant patient discontinued treatment at the NWH after receiving the diagnosis of a fatal fetal

TABLE 3
Variability in patient care

Treatment course	n	%
Patient discontinued care	21	9.0
Physician offered early induction	10	4.3
No early induction; nonviable fetus treated as viable	21	9.0
No early induction; otherwise, fetus treated as nonviable	182	77.8
Total	234	100.1

Data are presented for 234 pregnancies. Our study identified 239 pregnancies diagnosed with fatal fetal malformations at the National Women's Hospital between 2013 and 2018. For the analyses in this table, we removed 5 cases with significant missing data.

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anomaly. In most of these cases (15/21), the patients' charts simply noted that they failed to attend scheduled appointments, and no additional information was provided. In the remaining 6 cases, the patient missed appointments but self-reported at a later date that they delivered elsewhere and that their infant died shortly after birth. Only 1 case included actual verification of birth at a different hospital. Although there are other reasons that pregnant patients might discontinue treatment at the NWH, the files suggest that at least some exited the public system to interrupt their pregnancy privately. For example, 1 file noted that the patient had mentioned considering a self-abortion and then failed to attend future appointments.

High complication rates

The complication rates are presented in Tables 4 and 5. After dropping the 21 cases in which patients discontinued treatment, we present the complication rates for the remaining 213 pregnancies—the patients who stayed under NWH care until delivery. These complication rates are reported in the first column of Table 4. In the second and third columns, we present the national-level rates for the same complications. In the fourth column, we provide published estimates of these complication rates from other countries. We provide these national rates and published estimates as general benchmarks to help evaluate

whether the complication rates in our study population are atypically high.

Our first 5 complication categories were hemorrhage, infection, preeclampsia, gestational diabetes mellitus, and anemia. All five of these complication categories are high when compared to national rates, but only one of the five—infection—is also high when compared to published estimates.

Our sixth category, risk, contained any condition that put the patient at imminent risk for hemorrhage or infection during the pregnancy, labor, birth, or postpartum period. Four of every 10 pregnancies (43.7%) in our study population experienced a risk complication. Moreover, comparative data for the 3 subcategories of risk (polyhydramnios, premature rupture of membranes, and retained placenta) demonstrated notably higher rates than typically associated with pregnancy. For example, 17.8% of pregnancies in our population were diagnosed with polyhydramnios, which is 11.1 times higher than the upper end of published estimates, and a staggering 178 times higher than reported national rates. The rate of retained placenta in our study (17.4%) was nearly 6 times higher than the upper end of published estimates.

Our seventh complication category was an aggregate measure of atypical fetal presentation, which was divided into 1 of the following 3 subcategories: (1) breech presentation (18.8%), (2) exposed soft tissue (19.7%), and (3) true obstruction (11.3%). Overall, 41.8% of

pregnancies in our study were characterized by atypical fetal presentation.

As noted previously, whether the first 2 subcategories of atypical fetal presentation affected maternal health was primarily determined by the attending clinicians' interpretation of the Salvadoran anti-abortion law: some elected to deliver fetuses with exposed tissue or in breech presentation via cesarean delivery; others followed global protocols that indicate vaginal deliveries for pregnancies with a poor fetal prognosis.

Turning to the third subcategory, we found that the rates of obstructed labor—defined as any condition preventing the fetus from passing through the vaginal canal—were 1.9 to 3.8 times higher in our population than published estimates. Consistent with existing research,²⁷ this high rate of obstructed labor contributed clinically to maternal morbidity. We offer 2 illustrations. In the first, physicians aiming for vaginal delivery in a primigravida teen were unable to resolve obstructed labor even after using fetal head decompression, leading to prolonged labor, a grade 3 vaginal tear, chorioamnionitis, and ultimately a cesarean delivery. In another particularly remarkable case, a 22-year-old, primigravida woman whose fetus was diagnosed with bilateral renal pathology and early onset Potter sequence began contractions while the fetus still had a detectable heartbeat. Due to renal dysplasia the kidneys were enlarged and the fetus had developed a large abdominal perimeter. It became lodged in the vaginal canal after its head was delivered. Likely taking into account the nonviability of the fetus, the physician aimed to dislodge it by pulling strongly on its head—ultimately decapitating it. The remaining portion of the fetal body was delivered via cesarean delivery, and the pregnant woman ultimately suffered a third-degree vaginal tear, secondary anemia, preeclampsia, and a urinary tract infection in addition to the trauma of seeing her infant decapitated during delivery.

In Table 5, these complications are examined in aggregate. If we limit our atypical presentation variable to only true obstructions, we found that 54.9%

TABLE 4

Maternal physical health complications during pregnancies with lethal fetal malformations at the National Women's Hospital in El Salvador between 2013 and 2018 with comparisons

Complications by category	Conditions included in category	n	% Study population (n=213) ^a	% National comparison 1 ^b (n=143,402)	% National comparison 2 ^c (n=446,034)	% Published estimates
Hemorrhage	Hemorrhage	5	2.3	0.2	1.0	6.1–10.4 ^d
Infection	–Chorioamnionitis –Acute pyelonephritis –Urinary tract infection –Sepsis, septic shock	16	7.5	4.6	5.9	4.1 ^e
Preeclampsia	–Preeclampsia –Severe preeclampsia –HELLP	12	5.6	0.9	3.0	1.5–5.2 ^f
Gestational diabetes mellitus	Gestational diabetes mellitus	11	5.2	2.7	0.9	9.9 ^g
Anemia	Anemia	5	2.3	0.4	0.4	31.1 ^h
Risk of hemorrhage or infection		93	43.7	—	—	—
Polyhydramnios	Polyhydramnios	38	17.8	0.1	0.1	0.2–1.6 ⁱ
Premature rupture of membranes (PROM)	PROM	24	11.3	2.6	1.8	8.0 ^j
Preterm PROM	Preterm PROM	18	8.5	—	—	2.0–3.0 ^k
Retained placenta	Retained placenta	37	17.4	—	—	0.3–3.0 ^l
Other risk	–Prolonged or arrested labor –Precipitate birth –Placenta previa –Placental abruption –Uterine atony –Splitting of incision(s) –Severe vaginal tearing –Retroplacental hematoma	41	19.9	—	—	—
Any problematic presentation		89	41.8	—	—	—
Breech	Breech	40	18.8	0.5	2.4 ^m	3.0–4.0 ⁿ
Soft fetal tissue exposed	–Encephalocele –Omphalocele –Gastroschisis –Myelomeningocele –Spina bifida	42	19.7	—	—	—
True obstruction	–Cephalopelvic disproportion –Placenta previa –Dystocia caused by large fetal abdominal perimeter –Transverse positioning ^o	24	11.3	—	—	3.0–6.0 ^p
Other	–Hypokalemia –Aggravation of lupus nephritis –Nephrotic syndrome –Supraventricular tachycardia –Acute abdominal obstruction	5	2.3	—	—	—

Data are presented for 213 pregnancies.

HELLP, hemolysis, elevated liver enzymes, low platelet count syndrome; PPROM, preterm premature rupture of membranes.

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^a Our study identified 239 pregnancies diagnosed with fatal fetal malformations at the National Women's Hospital between 2013 and 2018. For the analyses in this table, we removed 21 cases in which pregnant patients exited the public health system before giving birth. We also removed 5 cases with extensive missing data; ^b National rates reported in this column were obtained by request from the El Salvador Sistemas Estadísticas de Salud under the Salvadoran Law on Access to Public Information and include the same 6-year average (2013–2018) as our study population; ^c National rates reported in this column were obtained by request from the El Salvador Sistema de Morbimortalidad en Línea (SIMMOW) under the Salvadoran Law on Access to Public Information and contained

all births treated at the national hospitals within MINSAL (Ministerio de Salud El Salvador) and include the same 6-year average (2013–2018) as our study population, except when specified otherwise; ^d Estimated pooled prevalence for the Latin American Region per a 2012 analysis of existing studies¹⁸; ^e Reported incidence of maternal infections in the United States as reported in a 2013 study of 1,001,189 deliveries at 355 US hospitals¹⁹; ^f Estimated pooled prevalence for the Americas region according to a 2013 analysis of existing studies²⁰; ^g Estimated pooled prevalence of gestational diabetes mellitus in middle income countries according to a 2021 analysis of existing studies²¹; ^h The World Health Organization's (WHO) estimated prevalence of anemia in pregnant women in Latin America for 1993 to 2005²²; ⁱ Estimated prevalence of polyhydramnios in all pregnancies²³; ^j Estimated prevalence of PROM in the United States²⁴; ^k Estimated prevalence or PPRM in the United States²⁴; ^l Estimated prevalence of retained placenta in all pregnancies²⁵; ^m Because of missing data in 2013 and 2014, this statistic only includes averaged data from 4 years (2015–2018); ⁿ Estimated pooled prevalence for 8 nations according to a 2015 analysis of existing studies²⁶; ^o We included 5 cases of transverse fetal positioning in the category of true obstruction because doctors at the National Women's Hospital were not regularly trained in external cephalic presentation and therefore do not perform fetal manipulation even in cases when it may be possible to avoid cesarean deliveries; ^p Estimated global prevalence from the WHO in the year 2000.²⁷

TABLE 5
Aggregate maternal physical health complications in pregnancies with lethal fetal malformations at the National Women's Hospital in El Salvador, 2013–2018

Physical health complication	n	%
Patient suffered at least 1 complication—liberal measure (breech births and soft tissue exposures are included as maternal health complications)	146	68.5
Patient suffered at least 1 complication—conservative measure (breech births and soft tissue exposures are not included as maternal health complications)	117	54.9

Data are presented for 213 pregnancies. Our study identified 239 pregnancies diagnosed with fatal fetal malformations at the National Women's Hospital between 2013 and 2018. For the analyses in this table, we removed 21 cases in which pregnant patients exited the public health system before giving birth. We also removed 5 cases with extensive missing data.

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of pregnancies with fatal fetal malformations experienced at least 1 serious maternal complication. If we broaden our measure of atypical presentation to also include breech presentation or soft tissue (given that these conditions sometimes triggered cesarean delivery), the overall complication rate increased to 68.5%.

High intervention rates

We documented all clinical interventions used to manage pregnancies with fatal fetal malformations in [Tables 6](#) and [7](#). Nearly half of the pregnancies in our study population (47.9%) were managed with either a cesarean delivery or another physically-invasive procedure (eg, dilation and curettage, amniodecompression, etc.). This rate increased to 57.3% if we also included the non-physically-invasive intervention of medication induction.

The case of a 40-year-old woman in her ninth pregnancy illustrates how the

complications documented in the previous section can require physically-invasive interventions. This patient's fetus was diagnosed with alobar holoprosencephaly, leading to reduced fetal swallowing and severe polyhydramnios. The patient underwent 2 amniodecompressions during the course of her pregnancy. In her 39th week, physicians delivered the fetus via cesarean delivery because of concerns related to cephalopelvic disproportion. After weeks of severe polyhydramnios, the patient suffered uterine atony and severe hemorrhage after birth, ultimately requiring an emergency hysterectomy.

Discussion

Principal findings

Individuals who were required to carry pregnancies with fatal fetal malformations to term (or until preterm labor began naturally) experienced high rates of maternal morbidity. More than half (54.9%) of the pregnancies experienced

at least 1 serious pregnancy-related health complication, whereas 47.9% underwent a physically-invasive medical procedure to manage complications, including cesarean deliveries, decompression amniocenteses, fetal head decompressions, and in one case, a full hysterectomy.

Clinical implications

When the clinical management of fatal fetal anomalies is legally regulated by an imprecise law, our study suggests that the clinical procedures enacted in response to the law are poorly standardized and cause striking inequities in patient care. In some cases, clinicians treated nonviable fetuses as if they were viable even if it required imposing unnecessary physically-invasive procedures on the pregnant patient. In most cases, clinicians seemed to interpret the law narrowly as only prohibiting early pregnancy interruption, while allowing other treatments, like fetal head decompression, to preserve maternal health. Even so, without the option of legal pregnancy interruption, clinicians were unable to avoid maternal health complications in most of the pregnancies in our study. In addition to generating absurd clinical contradictions (eg, creating a legal situation in which a nonviable fetus cannot be delivered early, but can be delivered through fetal head decompression), we found that the Salvadoran abortion ban frequently required clinicians to subject healthy patients to a course of treatment that generated maternal morbidity.

Research implications

As new laws are passed that prohibit pregnancy termination in cases of fatal fetal anomaly, future research must better document how specific fetal

TABLE 6**Clinical interventions for management of pregnancies with lethal fetal malformations at the National Women's Hospital in El Salvador from 2013 to 2018 with comparisons with national-level pregnancy data and published estimates**

Clinical interventions	n	% Study population (n=213)	% National levels for comparison 1 ^a (n=143,402)	% National comparison 2 ^b (n=446,034)
Total vaginal deliveries	154	72.3	--	--
Required medication induction	63	40.9 ^c	1.4	--
Total cesarean deliveries	59	27.7	30.7	29.6
Total additional invasive procedures (D&C, amniodecompression, amnioinfusion, fetal head decompression, hysterectomy)	53	24.9	--	--
Dilation and curettage	37	17.4	6.6	6.3

Data are presented for 213 pregnancies. Our study identified 239 pregnancies diagnosed with fatal fetal malformations at the National Women's Hospital between 2013 and 2018. For the analyses in this table, we removed 21 cases in which pregnant patients exited the public health system before giving birth. We also removed 5 cases with extensive missing data.

D&C, dilation and curettage.

^a National rates reported in this column were obtained by request from the El Salvador *Sistemas Estadísticas de Salud* under the Salvadoran Law on Access to Public Information and include the same 6-year average (2013–2018) as our specific sample; ^b National rates reported in this column were obtained by request from the El Salvador Sistema de Morbimortalidad en Línea (SIMMOW) under the Salvadoran Law on Access to Public Information for all births treated at the national hospitals within MINSAL (Ministerio de Salud El Salvador) and include the same 6-year average (2013–2018) as our study population, except when specified otherwise; ^c In 3 cases, it was unclear whether the vaginal delivery was induced or spontaneous, and this percentage was determined only after removing those 3 cases (ie, the denominator was 151 instead of 154). Mena Ugarte. Abortion bans, fetal malformations, and maternal morbidity. *Am J Obstet Gynecol Glob Rep* 2022.

TABLE 7

Aggregate clinical interventions for management of pregnancies with lethal fetal malformations at the National Women's Hospital in El Salvador, 2013–2018

Clinical Interventions	n	%
Patient underwent a physically-invasive procedure to manage pregnancy (cesarean deliveries, dilation and curettage, hysterectomy, amniocentesis, amniodecompression, fetal head decompression)	102	47.9
Patient underwent any medical intervention to manage pregnancy (physically-invasive procedures plus medication inductions of vaginal births)	122	57.3

Data are presented for 213 pregnancies. Our study identified 239 pregnancies diagnosed with fatal fetal malformations at the National Women's Hospital between 2013 and 2018. For the analyses in this table, we removed 21 cases in which pregnant patients exited the public health system before giving birth. We also removed 5 cases with extensive missing data.

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malformations generate specific health complications to better prepare clinicians who will face increased maternal morbidity in the laws' aftermath. Future research should also examine the psychological implications for patients who are required to carry nonviable pregnancies to term.

Strengths and limitations

Despite the richness of our data, our analyses are limited in significant ways.

First, the NWH was not equipped with specialized laboratories that could allow for prenatal karyotyping, nor did the hospital perform autopsies to confirm newborn diagnoses. We therefore relied on ultrasound analyses and post-birth clinical examinations to determine whether a pregnancy fit our criteria for inclusion. This limitation principally affected the confirmation of 2 chromosomopathies (trisomy 18 and 13), comprising 7 total cases. If a fatal fetal malformation was suspected but could not be confirmed via ultrasound or clinical analysis after birth, it did not meet our criteria for inclusion.

Second, although our study began in 2013, El Salvador did not begin systematic screening via ultrasound for fetal pathologies until 2016, suggesting that some cases that may have fit our

inclusion criteria between 2013 and 2015 were not captured.

Finally, because we lacked a control group of pregnancies with fatal fetal malformations that did have the option of early termination, we were unable to statistically evaluate the causal relationship between the legal context and maternal health complications in our study population. Nevertheless, given the clear counterfactual conditions implied by our research design (the likelihood that most documented complications could have been avoided with early pregnancy termination), our findings offer strong evidence that El Salvador's absolute abortion ban leaves clinicians and patients with no other option than to follow a course of treatment that frequently generates morbidity. ■

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