Special Section: Open Forum

Research Priorities and the Future of Pregnancy

TIMOTHY F. MURPHY

The term "ectogenesis" has been around for about a century now, and it is generally understood as the development of embryos and fetuses outside a uterus. In this sense, all in vitro fertilization (IVF) is ectogenesis, but in vitro development can only proceed to a certain point, at which time human embryos are then either implanted in the attempt to achieve a pregnancy, frozen for that use in the future, used in research, or discarded. Some researchers have attempted, however, to create alternative uterine environments for nonhuman mammals to extend embryonic and fetal development ex vivo all the way to a viable animal. These researchers have used various tanks and catheters in an attempt to mimic the uterine environment and placenta in regard to nutrients, hormones, temperature, and waste management. To date, researchers have removed goat fetuses from a living animal and have had some success in keeping them alive in amniotic tanks, but they have not achieved the complete ex vivo gestation of a mammal.[1] In a different kind of venture, researchers have used cells taken from a human uterus and overlaid them on an artificial scaffold in the hopes of creating an endometrial cell lining that could implant and develop IVF embryos.[2] It might be possible to develop this technique further to create a freestanding uterine structure to hold a developing embryo and fetus, although this is very much a matter of speculation.

Anna Smajdor has argued that human ectogenesis should have priority for public research funds because artificial wombs are morally preferable to in vivo gestation and childbirth, as she finds it unjust that women alone bear the risks that inhere in pregnancy and birth as against men, who face no such risks when they have children.[3] Smajdor quotes with approval a well-known declaration that pregnancy is "barbaric" and says that beyond its physical burdens on women, pregnancy also limits choices, takes time away from other ventures, and makes women vulnerable to confining social pressures. Gestation outside a human body would materially change the circumstances in which women have children by extinguishing those effects. Artificial wombs—if effective and safe—would bring the overall costs of women having children into line with what they are for men having children, and for Smajdor that day cannot come soon enough. She therefore argues that—as a requirement of justice—public research funds should be allocated to find alternatives to pregnancy and childbirth.[4] In its contrarian analysis of gestation, this claim borders on the revolutionary, for it does nothing less than chart a pathway for women to complete equity with men in regard to the risks and costs of having children, at least as far as gestation and childbirth are concerned.

For all that, this conclusion overreaches its evidence, because one of the standards that Smajdor invokes—the alleviation of pain and suffering—would move other conditions to the forefront of research priorities if that standard were

Cambridge Quarterly of Healthcare Ethics (2012), **21**, 78–89.

doi:10.1017/S096318011100051X

applied consistently. By itself, the view that other ills deserve greater research priority than artificial wombs does not mean that society may look the other way when it comes to the health risks of pregnancy, and neither does it render moot the second standard of evaluation (gender equity) that Smajdor invokes. Containing the health risks of pregnancy would not by itself make up for the social costs and impositions that pregnant women face. Those concerns are, however, separate from the claims made in favor of artificial wombs as a way of controlling pain and suffering, and it is those claims I want to look at here, in order to show why other health concerns should assume more importance for public research priorities than finding alternatives to in vivo gestation.

Note on Terminology

Depending on what happens in research, there may be a variety of choices ahead in gestating a human being outside the body of a woman. Like others who write in this area, Smajdor refers interchangeably to artificial wombs and ectogenesis. For the sake of expressing exactly what is at stake here, I use the term ''extra corporeal gestation'' (ExCG) to refer to fetal development that occurs outside a woman's body in the hopes of producing a child. I believe this term best expresses the intended goal of the research. ExCG distinguishes gestation from the limited ectogenesis that follows IVF, and it avoids distracting discussions about the meaning of ''artificial.'' The term ExCG has the additional benefit of not specifying any mechanism by which this process could occur; it would apply equally no matter if the gestation were to involve a mechanically operated tank, a uterus grown from human cell lines, an explanted human uterus, or a nonhuman uterus. Some version of all these techniques might come to pass, and they all share the feature that a child is gestated outside a human body. The term ExCG does exclude one prospect, though: the use of women in persistent vegetative states for the gestation of children, an idea that one commentator has defended under some circumstances but that will not be under discussion here because this option would still impose the burdens of pregnancy on a woman.[5]

Forcing Choices

In regard to estimating the value of ExCG, Smajdor offers a provocative forced choice. Imagine, she says, that in Society A women bear all the risks and burdens of gestation and childbirth, whereas ExCG does that work safely and effectively in Society B. In which society would you—she addresses the reader directly—prefer to live?[6]

In a sense, the very framing of this question decides the answer. Almost by moral reflex a reader should prefer the society that alleviates what risks and burdens it can, unless some significant loss would follow or unless there is some essential social good that could be preserved *only* through the preservation of the risks and burdens in question. It should also be noted that Smajdor's forced choice represents ExCG as perfected, as something that occurs without any kind of risk or cost, not even to children born that way; at least, she doesn't imagine they would be worse off than children born any other way. Neither does she allow that women lose anything by never becoming pregnant, such as a degree of emotional preparedness for motherhood or even the pleasure some women find

in the experience of being pregnant. Under these circumstances, the outcome is almost inevitable: who could prefer corporeal gestation of human children, with all the health costs that entails, if another alternative offered more overall safety and equity?

Framed as an either-or option, ExCG should probably prevail as the preferred method of gestation even if it accomplished only one of the following outcomes: it saved more lives than would happen if women gestated their children, it saved more women from ill health than would happen otherwise, it preserved more overall life career options for women, or it was safer for children ''born'' this way. As an ideal solution is always preferable to a messy, real-world solution, so long as ExCG improved the lives of the people involved and so long as it triggered no harms worse than already exist in childbearing, it would be preferable to old-fashioned gestation. To settle the answer to the question this way does not, however, get us very far in terms of research priorities. The real issues worth grappling with in Smajdor's analysis are where pregnancy stands on the ladder of human woes and what status it deserves when society draws up its publicly funded research priorities.

Setting Priorities from behind a Veil of Ignorance

As a starting point for her analysis, Smajdor considers an argument about research priorities for infertility treatment. Justine Burley has argued for priority for infertility treatment research over other, unspecified research expenditures, saying that infertility is the kind of condition that triggers entitlement to social restitution.[7] Following a line of argument that Ronald Dworkin advanced, Burley comes to that conclusion using a veil-of-ignorance methodology.[8] This methodology imagines that decisionmakers about fundamental social arrangements are situated behind a veil of ignorance as they make their choices. They don't know their own identities, but nothing about human nature, social circumstances, or the environment is unknown to them. Roughly speaking, the decisionmakers would know that most people want children (to judge from the vast number of people who do have them), that most people want children who are genetically related to them (to judge from how people do have children), and that most people who are clinically infertile are unhappy about their situation (to judge from the ever-expanding global market in assisted reproductive treatments). All things considered, infertility amounts to a ''deficit in personal resource holdings'' that can be involuntary and that inhibits the affected people in their capacity to pursue important life goals, which is how Smajdor summarizes Burley's view.[9]

Smajdor accepts the general line of reasoning advanced in this argument but believes that decisionmakers behind a veil of ignorance should assign greater research priority to overcoming the ills of gestation and childbirth than to overcoming infertility.[10] After all, infertility is not a problem for all infertile people, because some don't wish to have children, and some will not even be aware that they are infertile. By contrast, pregnancy and childbirth carry greater risks of morbidity and mortality than infertility per se, and they undercut autonomy in ways that infertility does not. Smajdor therefore imagines that decisionmakers behind a veil of ignorance should commit more money to researching and developing alternatives to in vivo gestation as restitution for the ills of pregnancy rather than commit funds to additional infertility research.

Smajdor is reluctant to conclude that people would actually make this decision at present even if they should, but more on that later.

In order to take a closer look at the meaning of a veil-of-ignorance methodology for these kinds of argument, I think it is useful to recall how and why John Rawls first advanced it.[11] It is true that Rawls was first and foremost concerned with access and equity in regard to social and economic advantages rather than advantages rooted in personal traits, something that Dworkin addresses directly. Even so, personal traits elide frequently into social advantages, because healthy people can better compete for social goods, compared to unhealthy people or people with disabilities, and that effect applies to pregnancy as well. Accordingly, it makes sense as a thought experiment to consider pregnancy in this framework, because it offers yet another reason to support the conclusion that the effects of pregnancy on women should be addressed as a matter of social justice. It is, however, important to keep in mind that Rawls used the veil of ignorance not to pass judgment on fine-grained questions of law and policy—let alone to rank issues on a funding hierarchy—but to identify principles by which to design legal and policy frameworks.

Specifically, Rawls argued that decisionmakers behind a veil of ignorance would agree unanimously to two main principles. The first principle—the principle of equal liberty—addresses political liberties (such as the right to speech, to assemble, to be free from arbitrary governmental action, etc.), and these are not at issue here.[12] The second principle—the difference principle—requires that social and economic inequalities be arranged so that they are attached to positions and offices open to all and so that these inequalities somehow work to the benefit of the least advantaged in society. This principle specifies that social and economic inequalities (read: advantages) are morally permissible so long as they are attached to offices and positions open to all as a matter of equality of opportunity and so long as they benefit in some way the least-advantaged members of society.[13]

How would these expectations apply to making judgments about the claim of ExCGs on public research funds? In bearing none of the burdens of pregnancy, men have a social advantage when having children that women do not. Moreover, even if some women can avoid pregnancy by adopting children or turning to surrogate mothers, the risks and costs of pregnancy are not avoidable for women considered as a class. The male-typical way of having children is closed off to women as a matter of course: It can only be a woman who gestates a child. Could society intervene in a way that satisfies the two conditions of the difference principle? Does this state of affairs justify a social intervention on the terms of the difference principle? Could society open up the advantages of the male way of having children to women, and could society find a way to return some of the benefit of male advantage to society's worst off?

Some social advantages—like ownership of property or remunerative jobs—can be opened at least in principle to those who do not enjoy them. By eliminating de jure and de facto obstacles, law and social policy can work to ensure that people of any skin color or sexual orientation, for example, can move toward those social goods through interventions like antidiscrimination law or programs. However, neither the law nor social policy can offer women the risk-free way of having children that men enjoy; that advantage is currently beyond

any institution's power to extend. As things stand now, the first condition of the difference principle could not be met by any social intervention.

The second condition could, however, be satisfied. If there are social advantages that all do not enjoy—such as the possession of vast fortunes—then the moral tolerance of those advantages turns on extracting some benefit from those who enjoy them on behalf of those who are the least advantaged in society. One way to derive this kind of benefit would be, for example, to tax ultrahigh incomes at a rate much higher than that for more modest incomes and to use those funds to subsidize healthcare or education for society's poorest people. For the sake of the argument, let me suggest that the same kind of approach might be taken relative to the advantage enjoyed by men who have children. A paternity tax might be imposed on them and earmarked to benefit people who are the least well off in society, and in this way the advantage that men enjoy over women when having children would be translated into some degree of benefit for others. Remember that behind the veil of ignorance, decisionmakers are planning for all possible persons they might be once the veil is lifted. It therefore makes sense to permit social advantages (because one might be in a position to enjoy them) while also ensuring some degree of protection for those with the fewest advantages (because one could just as easily be in that circumstance). From behind the veil of ignorance, a paternity tax could be seen as desirable for those who will directly benefit from it and as a tolerable cost of enjoying an important social advantage for those who will have to pay it.

Rawls typically invokes the least advantaged when identifying candidates to benefit from interventions to redistribute social goods in some way. It might make sense in this discussion to focus, however, not on the *least* advantaged in society overall but on the *less* advantaged of the two groups under comparison, men and women. As things stand, men enjoy an advantage in paternity that women cannot enter into, no matter how law and policies are arranged. Perhaps the social return should be, therefore, not to the poorest or most ill educated or other dispossessed group but to women, who are disadvantaged as a class by pregnancy. Maybe men who have children should be taxed, and maybe this revenue could be applied to biomedical or social science research that reduces the morbidity and mortality of gestation. In this way, fathers could shoulder some of the overall costs of pregnancy even if only indirectly, and women would derive some benefit in terms of lowered risks from pregnancy.

The foregoing analysis has thus far presumed no fundamental changes in the way that children are gestated and born. However, we must also ask whether it would be morally desirable to find ways to change that status quo through research into ExCG. The difference principle has as its goal protecting access to advantages to those who do not have them. In order to decide whether the ills of pregnancy are the kind of thing that should be redressed by research investments to offer women the option of pregnancy bypass, we need to know not just that it carries risks but how bad pregnancy is compared to the ills that otherwise beset human beings.

The Case against Pregnancy

The prospects of pain and suffering loom large in Smajdor's analysis of pregnancy, and as a matter of narrative fact, she says not a word in its favor.

On the contrary, she says, ''Gestation and childbirth, it seems to me, are very likely to be associated with pain and suffering in a way some other conditions might not be.''[14] Not only that, things don't look especially good for changing those facts anytime soon. She says, ''However much modern medicine can do to improve outcomes in pregnancy and child birth, it cannot remedy the fact that these processes impose risks on women that far exceed the risks of normal day-to-day living.''[15] On top of that are, of course, the social costs of pregnancy, including expected deference on the part of the woman to the health of the fetus (at minimum, no endangering behavior and, beyond that, even behavior that actively benefits the fetus) and lost social opportunities (such as the ability to work at a financially rewarding but time-consuming job), but seen this way, pregnancy constitutes a threat to women's health and to the social goods that are important to a valuable and autonomous life. Let me put the costs of pregnancy into relief this way: some males become fathers without ever knowing it. Paternity unaware—which involves no risks to health or life, no social policing, and no loss of social opportunities—is as distant an experiential antipode to maternity by pregnancy as one can get.

For women, the significant health risks of pregnancy include hypertension, preeclampsia, eclampsia, hemorrhage associated with placenta disorders, and ectopic gestation. All these conditions can lead to death if not managed properly.[16] Moreover, pregnancy can have long-term effects on women's cardiac function, pulmonary function, renal and urinary functions, endocrinological functions, and more. Giving birth can also involve separate threats to the health of a woman, including lacerations, retained placentas, uterus ruptures, infections, and fevers. Intended to prevent certain complications, cesarean deliveries also carry their own risks of morbidity and mortality. Exact calculations of the total amount of ill health that is strictly attributable to pregnancy are difficult to estimate, but calculations of death related to pregnancy are clearer. For example, in the United States, the Centers for Disease Control and Prevention reports maternal deaths per 100,000 live births as follows: for 2000, 9.8 deaths; 2001, 9.9 deaths; 2002, 8.9 deaths; and 2003, 12.1 deaths.[17] (These numbers take into account women who die while giving birth and from related complications for a certain period afterward.) Outside the developed world, deaths associated with pregnancy can be even more frequent. The United Nations estimated that in 2005 more than half a million women died because of complications of pregnancy.[18] All things considered, having children poses significant threats to the health and life of women.

Ranking comparative threats to health from behind a veil of ignorance—in order to undertake redress where appropriate—can only be a complicated matter; the complications here start with the adequacy of the criteria used to assign comparative rank. Smajdor notes that Dworkin rejects using criteria such as well-being or suffering when planning healthcare arrangements from behind a veil of ignorance, because these terms are not objective in any way that permits using them to establish obligatory levels of commitment.[19] Indeed, Dworkin's approach in general emphasizes agreement instead of gesturing toward medical objectivity in moral commitments about healthcare. Smajdor agrees with Dworkin on this point—or at least does not disagree—but she thinks that people behind a veil of ignorance would still be free to make their own estimates of what is most important when it comes to well-being and suffering. In other words,

even if decisionmakers agreed that well-being could not be objectively determined, they could nevertheless deploy their own estimates of worst threats to well-being. Smajdor thinks that decisions about health research priorities would be guided by people's estimate of the probability of being affected by a particular condition, and she says that if a veil-of-ignorance discussion were to be held right now, she expects decisionmakers would *not* assign much significance to infertility or pregnancy.[20] These indeterminacies open the door to even more variability than Smajdor expects from decisionmakers. Mostly importantly, they might not be persuaded of the importance of absolute health-risk parity between women and men.

It is not pregnancy per se that Smajdor objects to but its pain and suffering, let us recall, and as far as those ills are concerned (putting the question of diminished autonomy to the side for the moment), it is not clear that decisionmakers behind a veil of ignorance should (or would) prioritize research commitments to pregnancy ahead of other conditions whose pain and suffering equal or exceed that involved in pregnancy. When it comes to women's health, the shortcomings of infertility and the ills of pregnancy are only part of a bigger picture. When decisionmakers are deliberating behind a veil of ignorance about ways to protect all possible selves they might become, it would not be wise for them to focus on infertility and pregnancy to the exclusion of other sources of pain and suffering. For example, in 2006, in the United States, 760 women died from pregnancy and childbirth.[21] By contrast, tens of thousands of women died from respiratory diseases, liver diseases, and kidney diseases, and many more died from chronic respiratory diseases and accidents. Numerous human experiences involve a roiling mix of pain, suffering, and barbarism, including genetic disorders, neurological damage, psychiatric illness, and traumatic injuries, and these diseases and conditions take a devastating toll on the health of women. Moreover, many of the pregnancy risks that Smajdor mentions are recoverable (they do not last beyond the pregnancy) or are at least medically manageable afterward (as against other life-threatening disorders for which there are no good treatments). The pain and suffering of pregnancy do obstruct the possibility of pursuing as good a life as might be possible otherwise, but the totality of other diseases and disorders inflicts pain and suffering on women in ways that equal or exceed the ills of pregnancy.

Decisionmakers behind a veil of ignorance would probably do better to prioritize research funding in a way that addresses the pain, suffering, and premature death whose toll is greater than that of pregnancy. At the very least, pregnancy should not be evaluated as if it were a stand-alone issue. If, moreover, pain and suffering are the criterion for establishing research priorities, one could even argue that priority should be given to helping women around the world who would benefit from better healthcare while pregnant now rather than researching initiatives that will benefit women who will exist in the future. At the very least, it would have to be asked why women living in the future (whose ill health is theoretical) have a greater claim on public funding for healthcare than women currently living (whose ill health is actual).

Parity between Men and Women

Smajdor emphasizes the point that the health risks of men having children are low enough to estimate them at zero. To be sure, some men are not healthy

enough to have intercourse, and taking that route to have children would be risky for them. However, even those men have other options available, such as IVF, so the risks are mostly negligible for most men. If complete equity in risks between men and women were the goal, then Smajdor would be right to reject any alternatives but ExCG. It is not clear from Smajdor's analysis, however, why decisionmakers behind a veil of ignorance *must* commit themselves to the reduction to zero of health risks in pregnancy for women, even if that is what the risks are for men. Let us recall that the objection to the health risks of pregnancy is that they obstruct the ability of affected women to pursue important life goals, and Smajdor has said in a couple instances that pregnancy is risky beyond the risks of normal, everyday life.[22] Why would it not be enough to bring the risks of pregnancy and childbirth into line with the risks of everyday life? Smajdor doubts that medicine will be able to bring pregnancy into that range of risk, but let us imagine that it could. What would remain of her analysis if the health risks of pregnancy were no greater than the risks of everyday life?

This standard—risk at the level of everyday life—is one that is highly dependent on context for significance, to be sure. The everyday risks faced by a young woman attending a pricey New England college are significantly different than the everyday risks faced by a young woman of the same age incarcerated in one of California's sprawling prisons. The everyday risks faced by a 40-year-old homeless woman living under a highway bridge are significantly different than the everyday risks faced by a woman of the same age living in a gated community. Depending on their environment, it might not be a comfort for women that the risks of their pregnancies would be in line with the risks of their everyday lives. Despite the fact that everyday risks do not always indicate a desirable level of personal safety or well-being, let me continue to press this line of argument. Could we not reasonably say that an acceptable level of risk for pregnancy could be the level of risk faced by women who have never become pregnant, using that overall threshold as the threshold of everyday risk? This is not to say that women who have never become pregnant face no health risks, but it is to say that they face no risks *because of pregnancy*, which is the relevant point of difference between women as a class and men who have children. Bringing the risks of all women down to the level of women who never become pregnant would be desirable on its face simply as a matter of overall harm reduction, but it also offers decisionmakers behind a veil of ignorance an option other than ExCG. If the risks of pregnancy could be brought into line with the risks of everyday life—defined for the purposes of the argument as the risks faced by women who never become pregnant—it seems that Smajdor's view that funds should be devoted to the development of ExCG would have less to recommend it, especially because there are other choices to consider.

If we theorize from behind a veil of ignorance about redress—in the form of public commitments to research or healthcare—to contain the risks of pregnancy, we have at least these options to consider: (1) bring the risks down for all women to the level faced by women who already enjoy the most advantages, (2) bring the risks down to the level faced by women who have never become pregnant, (3) reduce the risks of pregnancy to the risks of everyday life, (4) contain all risks to women from pregnancy by perfecting medical management for all pregnancy-related conditions, and (5) extinguish any and all risks to women by perfecting methods of ExCG. All these outcomes would improve the lot of women as a class

as they have children, so none of them is in question on that account. The question is why the quest for ExCG should prevail as the chosen mechanism of redress. Pregnancy that is not riskier than the risks of everyday life—to return to that option for the moment—doesn't obstruct women's lives in significant ways (depending, again, on context), and for that reason would attract less attention as a matter of redress. After all, it is not a required objective for behind-the-veil-of-ignorance deliberations to eradicate all differences between groups or to completely extinguish health risks for particular groups simply because they are less common or nonexistent in another group. If there were no other health risks for women except those associated with pregnancy, one might argue that complete health-risk equity with men should be the goal of research, but given competing demands of justice on the public fisc, bringing the risks of pregnancy into line with the risks of everyday life seems entirely reasonable as a means of redress for the health-risk inequities women face. At the very least, decision-makers behind a veil of ignorance would have to engage these questions and make their own judgments and estimates accordingly.

Pain and Suffering

At this point, I want to draw attention to Smajdor's use of the terms ''pain'' and ''suffering,'' because they further complicate deliberations behind a veil of ignorance. Smajdor uses pain and suffering to express the totality of misery that attaches to pregnancy, and she treats the terms as more or less interchangeable. The reason for deploying them both seems to be largely for emphasis rather than to identify two distinct phenomena, but I think there are reasons to distinguish between pain and suffering in a way she does not. In order to express matters more precisely, 'pain' may be defined as the immediate experience of noxious stimuli, and there is plenty of that in pregnancy (for example, nausea, vomiting, backaches, and abdominal pressure, among others). By contrast, suffering involves psychological experiences that are dislocating in profound ways, usually in ways that disrupt an expected future.[23] For example, fleeing an advancing enemy army may not involve any pain per se, but the experience may elicit suffering because the military threat shatters families, the sense of security, and expected futures. Pregnancy may involve suffering under some circumstances. If a pregnancy is unplanned or involuntary, a woman might not know where the pregnancy will lead, and psychological worries (even despair) may profoundly diminish her life. Even so, these dislocating effects of a problematic pregnancy need not involve pain properly speaking. Moreover, the noxious elements of pregnancy do not usually trigger the suffering sense of a profoundly altered future, in which a woman is beset in her very identity. I bother to make this distinction between pain and suffering because it seems relevant in assessing pregnancy's burdens.

What is worse, pain or suffering? What is worse, the immediate pain that occurs when one's legs are injured by a bomb or the suffering that occurs when one's future as an Olympic skier is destroyed that way? What is worse, the pain that attaches to childbirth or the suffering that occurs when one's child dies from traumatic injuries for which there are no good treatments? Pain and suffering are incommensurable states in many ways, making it difficult to compare them directly, but the lack of an objective standard for measuring their relative priority

would mean that decisionmakers behind a veil of ignorance would be free to make estimates according to their own judgments. Some might well rank suffering as a higher research priority than pain, especially transient and/or medically manageable pain. Others might put extreme pain ahead of the everyday suffering that everyone will know in life, such as the illness and death of parents, family members, and close friends. This variability shows that uncoupling pain and suffering—which I think is legitimate to do—complicates any easy assumption that the ills of pregnancy stand alone as conditions deserving biomedical redress, and deliberations about research priorities can grow complicated very quickly once one takes the whole spectrum of human woes into account.

Beyond Pain and Suffering

The alleviation of pain and suffering is, of course, only one rationale Smajdor puts forward in defense of ExCG research. The resolution of these ills one way or the other—by diminishing them or eradicating them—does nothing to address the question of gender equity, namely the differential social costs borne by women when having children. Even if the medical management of pregnancy were perfected to the point that no meaningful health problems occurred, women would still face loss of opportunities because of the time and effort given over to pregnancy. For example, women would still be expected to behave in ways that posed no danger to their fetuses and would be expected to devote due attention to prenatal care and visit their doctors, not to mention avoidance of drugs and alcohol. The timing of their pregnancies would also remain subject to social opinion about having babies too early or too late in life and about having too few or too many children, and that social opinion—enforced in various ways—constrains women's autonomy. As Smajdor puts it, ''Pregnant women are routinely expected to subsume their appetites and desires into those that would be in keeping with the well-being of the fetus.''[24] In some cases, prosecutors even jail pregnant women to protect fetuses against effects of maternal drug use.[25]

What matters to Smajdor and to Tuija Takala as well is that the social expectations of women are vastly unequal compared to those of men.[26] Men face no comparable scale of social expectations or legal interventions to enforce responsible parenthood during their children's gestation, expect perhaps for some policing in timing of having children. In general, it is not a very good idea for boys to have children when they are first able to do so or for older men to do so in the waning time of their lives. Even when males do have children at the edges of the lifespan, they are often socially ''excusable'' in the sense that they are not usually the primary caregivers for their children. The willingness of women to pick up the costs of childbearing for very young and very old fathers provides a safety net for the children involved. Things are very different for women. A 10-year-old girl who became pregnant in Spain in 2010 made international headlines,[27] and women who want to bear children after menopause continue to provoke sharp controversy.[28,29]

If comparable freedom in life choices is the standard for judging gender equity, pregnant women will lag in the range of freedom granted to them by social expectation. For example, because of the time pregnancy requires, women will

always lag in competitiveness in the marketplace for jobs. Not even the perfection of medical care for the health risks of pregnancy would bring women to overall parity in a social sense. To iterate the costs to autonomy from pregnancy is to make a strong brief on behalf of their remedy, and ExCG would be one way to help women achieve social equity in that regard. However, as in the case of ranking pregnancy among all other causes of pain and suffering, the same caution would apply. Research into ExCG in the name of gender equality would take priority only to the extent that other gender inequalities are not worse. Decisionmakers behind a veil of ignorance would have to estimate how to protect themselves from the worst kinds of gender inequality and determine exactly where pregnancy fit into their overall estimates.

Either as a way of reducing pain and suffering or as a way of equalizing social opportunity, ExCG research belongs on the ladder of research priorities only in proportion to the deficits pregnancy introduces in women's lives. Let us have searching deliberations about exactly what rung it should occupy on that ladder while keeping in mind the full panoply of women's experiences, not only in societies that hold gender equity out to themselves as an aspirational goal but also in societies in which gender equity is only darkly perceived.

Notes

1. Klass P. The artificial womb is born. *New York Times* 1996 Sept 29.
2. Liu HC, He Z, Chen C, Rosenwaks Z. Ability of three-dimensional (3D) engineered endrometrial tissue to support mouse gastrulation in vitro. *Fertility and Sterility* 2003;80:78.
3. Smajdor A. The moral imperative for ectogenesis. *Cambridge Quarterly of Healthcare Ethics* 2007;16:336–45.
4. Smajdor 2007, at 340.
5. Ber R. Ethical issues in gestational surrogacy. *Theoretical Medicine and Bioethics* 2000;21:153–69.
6. Smajdor 2007, at 343.
7. Burley J. The price of eggs: Who should bear the cost of fertility treatments? In: Harris J, Holm S, eds. *The Future of Human Reproduction: Ethics, Choice, and Regulation*. Oxford: Clarendon Press; 1998:127–49.
8. Dworkin R. Foundations of liberal equality. In: Peterson GB, ed. *The Tanner Lectures on Human Values*, vol. XI. Salt Lake City: University of Utah Press; 1990:3–119.
9. Smajdor 2007, at 338.
10. Ibid., at 343.
11. Rawls J. *Justice as Fairness.* Cambridge: Belknap Press; 1971:42–3.
12. Rawls 1971, at 60.
13. Ibid., at 42–3.
14. Smajdor 2007, at 339.
15. Ibid., at 340.
16. Cunningham FG, Gant NF, Leveno KJ, Gilstrap LC, Hauth JC, Wenstrom KD. *Williams Obstetrics*, 21st ed. New York: McGraw-Hill; 2001.
17. Centers for Disease Control and Prevention, Department of Health and Human Services. "Maternal Mortality and Related Concepts," Feb 2007; available at cdc.gov/nchs/data/series/sr_03/sr03_033.pdf (last accessed 26 Sept 2011).
18. Maternal Mortality in 2005: Estimates Developed by WHO, UNICEF, UNFPA and the World Bank. World Health Organization, Geneva 2007; available at http://www.who.int/whosis/mme_2005.pdf (last accessed 26 Sept 2011).
19. Smajdor 2007, at 339.
20. Ibid., 343.
21. National Vital Statistics, 2009;57 (Apr 17); available at www.cdc.gov/nchs/data/nvsr/nvsr57/nvsr57_14.pdf. (last accessed 26 Sept 2011).
22. Smajdor 2007, at 340.

23. Murphy TF. The ethics of responding to pain and suffering. In: Angelos P, ed. *Ethical Issues in Cancer Patient Care*, 2nd ed. New York: Springer; 2008:117–34.
24. Smajdor 2007, at 340.
25. Ibid., at 341.
26. Takala T. Human before sex? Ectogenesis as a way to equality. In: Simonstein F, ed. *Reprogen-Ethics and the Future of Gender*. Dordrecht: Springer; 2009:187–95.
27. Spain: 10-year-old gives birth. *New York Times* 2010 Nov 3.
28. Heffner CJ. Advanced maternal age. How old is too old? *New England Journal of Medicine* 2004;351:1927–9.
29. Mori TT. Post-menopausal pregnancy is permissible for women below 60 years of age. *Human Reproduction* 1994:9:187.