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Interpreting Evidence:

why values can matter as much as science

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Abstract

Despite increasing awareness of the ways in which non-epistemic values play roles in science, many scientists remain reluctant to acknowledge values at stake in their own work. Even when research clearly relates to risk assessment and establishing public policy, contexts in which the presence of values is less likely to be contentious, scientists tend to present such research as merely involving empirical questions about what the evidence is. As a result, debates over policy-related science tend to be framed as purely epistemic debates over the state of the evidence. We argue that this neglects the important ways that ethical and social values play legitimate roles in judgments about what we take to be evidence for a particular policy. Using the case of recent disputes about the relative safety of home birth, we argue that although the debate has been framed as a purely scientific one about the empirical evidence for home birth, it actually involves disagreements about underlying value assumptions. If our claims are correct, then in order to move the debate forward, scientists will need to engage in a critical discussion about the values at stake.

Despite Increasing Recognition of the ways in which ethical and social values play a role in science (Kitcher 2001; Longino 1990, 2002), scientists are often still reluctant to acknowledge or discuss ethical and social values at stake in their research. Even when research is closely connected to developing public policy, it is generally held that it should be empirical data, and not the values of scientists, that inform policy. According to this view, scientists need not, and should not, endorse non-epistemic values related to their research, as doing so may bias their assessment of what the evidence is. As a result, debates over science-based policy tend to be construed solely as empirical discussions to be ultimately decided by the scientific evidence.

We argue that this neglects the important ways that ethical and social values play legitimate roles in judgments about what we take to be evidence for a particular policy. Using the case of research on the relative safety of home birth, we will show that although differing views among scientists are presented solely as disagreements about the empirical evidence for home birth safety, the debate ultimately results from implicit disagreements over social and ethical values at stake in interpreting and assessing the evidence. Specifically, we show that disputes about the relative safety of home birth depend on value judgments about the sorts of risks that are considered relevant, how particular risks should be weighed, how much risk is acceptable when adopting public policy related to pregnancy, and how competing goods should be balanced in light of disagreements about the strength of available evidence. These value considerations are relevant to determining whether the existent scientific evidence is thought to be sufficient, whether it is taken to constitute evidence, and the extent to which it is thought to support a particular public policy.

The debate on home birth research is a particularly telling instance of how scientists can fail to recognize the role of non-epistemic values in scientific disputes. First, it is an example in which the scientific evidence at stake is important for grounding public policy, such as recommendations to would-be mothers, doctors, and midwives; certification regulations; restrictions on home birth; or policies on availability of transportation to hospitals. In such cases, there is a tendency to think that good public policy ought to be grounded on sound scientific evidence, and one might believe that sound science must be kept independent of non-epistemic values. However, given the complexities of policy decisions, the uncertainty of scientific claims, and the intricacy of the science useful for policy making, what counts as sound scientific evidence, questions about how much evidence is sufficient to serve as the basis of particular policy, or what studies are sufficiently reliable to ground policy decisions arguably clearly involve non-epistemic value judgments. Second, the home birth debate ostensibly involves assessment about risks, and although some might take risks evaluations to be value-free (Covello et al. 1983; Miller 2007), there is significant agreement that such assessments, particularly those related to protecting human health, include central ethical assumptions, such as what counts as a serious risk, what is an acceptable level of risk of death or sickness, what are the standards to judge that unmanageable risks are not present, or what is the relevant time frame for investigating such risks. Furthermore, a significant amount of research has shown that social affiliations, such as profession, gender, and political ideologies, can be relevant to determining what one takes to be a risk (Douglas and Wildavsky 1982; Eiser, Miles, and Frewer 2002; Finucane and Holup 2005; Kunreuther and Slovic 1996; Savadori et al. 2004; Slovic 1998; Wynne 2001). Thus, the home birth example is a particularly useful one for examining how non-epistemic value judgments can be obscured or ignored, even when evidence indicates that such values are relevant.

We will begin by presenting a brief overview of research on home birth and showing that both sides are in fundamental agreement about methodological and empirical issues. Ultimately, we will show that disagreements between scientists who conclude that the existing evidence establishes the relative safety of home birth and those who conclude the opposite rest on disagreements about non-epistemic values. We end by considering the implications this has for debates over policy-related science more generally.

The Case of Home Birth Research

For the past two decades, there has been intense debate about whether home birth is a safe alternative to hospital birth for low-risk women. Some research shows an increased risk of infant and maternal morbidity and mortality in home births (Bastian, Keirse, and Lancaster 1998; Kennare et al. 2010; Malloy 2010; Mori, Dougherty, and Whittle 2008; Pang et al. 2002; Woodcock et al. 1994). Other studies show planned home births do not increase infant and maternal morbidity and mortality, and that they have lower rates of obstetric interventions, such as electronic fetal monitoring, cesarean section, and episiotomy (de Jonge et al. 2009; Hutton, Reitsma, and Kaufman 2009; Janssen et al. 2002, 2009; Johnson and Daviss 2005; Lindgren et al. 2008; Woodcock et al. 1994).

Despite the presumed uncertainty about the relative safety of home birth, firm positions have been taken on both sides of the debate. The American, Australian, and New Zealand Colleges of Obstetricians and Gynecologists are opposed to home birth (McLachlan and Forster 2009). The American Medical Association (AMA) and the American College of Obstetricians and Gynecologists (ACOG) argue that the safest setting for labor and delivery is in the hospital or a birthing center within a hospital complex. In its most recent opinion, the ACOG (2011) emphasizes that although the absolute risk of planned home birth might be low, it carries a significantly higher risk of neonatal mortality when compared to planned hospital births. At the same time, organizations such as the United Kingdom's Royal

College of Obstetrics and Gynecology and Royal College of Midwives, as well as the American Public Health Association, and the American, Australian, New Zealand, and Canadian Colleges of Midwives, support the option of home birth for low-risk women (McLachlan and Forster 2009; Young 2008).

Although it seems relatively uncontroversial that value judgments are relevant to assessments of risk and safety, disagreements about home birth have been construed as disagreements about the relative merits and limitations of particular studies on home birth and the overall quality of the existing evidence. Opponents of home birth claim that most studies supporting the safety of this practice have important limitations and are not scientifically rigorous, and thus, that home birth safety is not supported by the scientific evidence (ACOG 2008, 2011; AMA 2008; Pesce 2009). Proponents, on the other hand, argue that critics are simply disregarding the balance of available scientific evidence on the relative safety of planned home births for low-risk women (Cohain 2008; Downe, Walsh, and Gyte 2008; Lowe 2009; McLachlan and Forster 2009; Newman 2008; Young 2008). Moreover, because both sides believe that the scientific evidence is on their side, they have accused the other of grounding their conclusions on politics rather than science and have urged policymakers to promote public policies that are based on evidence rather than ideology (Downe, Walsh, and Gyte 2008; McLachlan and Forster 2009; Pesce 2010).

Yet, despite the desire to exclude “politics” from the debate and to focus on the scientific evidence, whether the existent scientific evidence is thought to be sufficient, whether it is taken to constitute evidence, and the extent to which it is thought to support a particular public policy depends on non-epistemic value judgments. The debates over these studies have little to do with substantial disagreements about empirical or methodological issues; rather, the debates result from implicit disagreements over social and ethical values at stake in assessing labor- and delivery-related risks. By identifying the particular value judgments at stake, we aim to show how the two sides of this debate talk past each other. In order to move the debate forward, scientists must engage in a critical discussion about the values at stake. In other words, ironically, we need to talk about “politics” as much as about science.

Where the Agreements Lie

Although the terms of this debate are presented as if they rested solely on empirical and methodological disagreements about the quality of the evidence provided by home birth safety studies, a careful evaluation of the discussion suggests otherwise. It is true that empirical studies evaluating the safety of planned home birth for low-risk women face several obstacles. Interestingly, however, both proponents and opponents of planned home birth agree about these obstacles. For instance, both sides of this debate join most of the scientific community in their belief that well-designed, randomized, placebo-controlled trials (RCTs) are the gold standard for assessing the efficacy of new interventions. Thus, both sides concur, whether rightly or wrongly, that RCTs would provide the best evidence to determine the relative safety of home birth (ACOG 2008, 2011; AMA 2008; Borgerson 2009; de Jonge et al. 2009; Grossman and Mackenzie 2005; Kennare et al. 2010; McLachlan and Forster 2009; Steer 2008; Tracy 2009; Worrall 2002). Both sides also recognize that conducting RCTs is unfeasible for a variety of reasons, the most challenging of which is that pregnant women are unwilling to be randomly assigned a place of birth regardless of their preferences (Hendrix et al. 2009). Also, RCTs require either a large number of participants or a sufficiently frequent adverse outcome in order to show statistically significant differences between home and hospital births. Neither of these conditions obtains. Because only a very small number of women have planned home births in most Western countries, recruiting a sufficiently large sample size is difficult. Even the country with the highest rate of home births, the Netherlands, has a home birth rate of only approximately 30% (de Jonge

et al. 2009), and most industrialized countries have considerably lower rates: in 2007, home birth in the United States accounted for merely 0.62% of all births, and in countries such as England that have experienced an increase in recent years, the home birth rate was only 2.9% in 2008 (MacDorman, Menacker, and Declercq 2010; ONS 2010). Moreover, the outcomes of interest in these studies—infant and maternal morbidity and mortality—are quite rare in low-risk women. Thus, it would be difficult to show statistically significant differences. Hence, even when there is a clear recognition of the challenges that RCTs impose on determining the relative safety of home birth, whether rightly or wrongly (Worrall 2002), both sides agree that such trials would provide the best evidence.

Both sides of the debate also agree that in the absence of RCTs, well-conducted, adequately powered observational studies are important in determining the circumstances under which home birth may be a reasonably safe option (ACOG 2011; de Jonge et al. 2009; Kennare et al. 2010; McLachlan and Forster 2009; Pesce 2010). Further, opponents and proponents agree that many of the observational studies performed, both prospective and retrospective, suffer from a variety of methodological limitations, and both sides agree that some of those limitations are more damaging than others (ACOG 2011; Janssen et al. 2009). One of these limitations is the possibility of selection bias. Because women who have home births are self-selected, differences in findings between the compared groups might be the result of unmeasured characteristics of women who chose home birth *concur*. For example, women who choose home birth may have better nutrition or stronger family support systems, and this might affect both maternal and neonatal mortality and morbidity. Similarly, observational studies suffer from a variety of limitations related to the effects on outcomes of a variety of confounding variables, such as skill of the birth attendant; differences in defining appropriate inclusion criteria for “low-risk” status; birth certificates that often cannot reliably distinguish between high-risk, unplanned, unassisted home births and planned home births; or inability to determine whether hospital transfers in home births occurred before or during labor (de Jonge et al. 2009; Janssen et al. 2009; Kennare et al. 2010; Malloy 2010; Mori, Dougherty, and Whittle 2008).

Clearly, these limitations affect observational studies in general, and not just studies on the safety of place of birth. More importantly, although the degree to which these limitations affect particular projects evaluating home birth varies, studies both for and against the relative safety of home birth are affected by these problems—something that both sides of the debate acknowledge (ACOG 2011; Bastian, Keirse, and Lancaster 1998; Kennare et al. 2010; Pang et al. 2002). Similarly, both sides acknowledge that some of the studies supporting the relative safety of home birth, especially de Jonge et al. (2009) and Janssen et al. (2009), are methodologically strong.

Where the Disagreements Lie

While proponents and opponents of home birth are in agreement about most of the significant methodological issues at stake, they arrive at very different conclusions about how much evidence is sufficient and whether the existing evidence is good enough to justify the availability of home birth for low-risk women. And the central disagreements pivot on the value accorded to the evidence when such evidence is presumed to either support or fail to support a particular public policy on home birth. Contrary to what might be said, proponents and opponents of home birth do not appeal to different methodological standards. Rather, they appeal to different implicit non-epistemic value judgments. In particular, they disagree about how particular risks should be weighed, how much risk is acceptable when adopting public policies that involve pregnancy and delivery, and how competing goods should be balanced in light of existing limitations in the available

evidence. The disagreements are thus about ethical and social values, rather than about purely empirical or scientific features of the evidence.

In what follows, we discuss some of these specific disagreements and identify the implicit and interrelated ethical value judgments involved. Our purpose here is not to endorse the value judgments made by either side in the debate, but simply to make them explicit. Of course, making such judgments explicit may also reveal that some of them are implausible.

One of the main areas of disagreement among proponents and opponents of home birth is how much weight to give to worst-case scenarios. All recognize that even in low-risk pregnancies, serious intrapartum complications may arise without much warning. What is thought to be an uncomplicated pregnancy during antepartum care can become a high-risk one rather quickly, due to conditions such as cord prolapse, postpartum hemorrhage, or shoulder dystocia (ACOG 2011; Ellwood 2008; Tracy 2009). Because urgent obstetric care is required to ensure the safety of mother and child in such cases, opponents believe that it is unreasonable for mothers to run the risk of endangering their health and particularly the health of their child (Harvey 2009; Tracy 2009). Proponents, on the other hand, seem to assume that some degree of risk is acceptable, particularly if it would result in additional benefits related to giving birth at home.

Determining the weight of particular risks is not an exclusively empirical matter of calculating the probability of such risks. A variety of value judgments also play a role in risk assessment, including assumptions about what the potential benefits of home birth are, how valuable those benefits would be, how serious adverse outcomes would be, whether there are equally good lower-risk alternatives available, and whether there are ways to manage or reduce existing risks.

Opponents and proponents of home birth express different value assumptions about these different factors. Opponents assume that whatever benefits women might receive from giving birth at home, such as a familiar environment, more control over the birthing process, the ability to choose, and the decreased risk of obstetric interventions, are not sufficient to outweigh the risk of a possible emergency with its related negative outcome for mother and child. Proponents, on the other hand, seem to assume that given the small chance of an emergency, the benefits associated with home deliveries make the risk of an emergency acceptable. Moreover, proponents assume that strategies for managing emergency risks, such as ensuring adequate classification of low-risk pregnancies or providing appropriate transportation in case of emergencies, are suitable risk-reduction strategies, while opponents seem to assume that such management plans are insufficient or are appropriate only in the presence of highly regulated and integrated health care systems.

A second source of disagreement is that proponents and opponents of home birth seem to hold different views about the nature of pregnancy and childbirth, so that they come to different conclusions about what type of setting the scientific evidence supports and what the evidence is evidence for. Opponents of home birth appear to conceive of labor and delivery as intrinsically risky activities. Hence, they interpret the existent evidence as supporting policies that make hospitals the best environment for delivering a child. For opponents of home birth, a hospital setting has already been established to be safe and best equipped to deal with medical emergencies. For instance, they note that in 1900, when 95% of births occurred at home, there were 850 maternal deaths per 100,000 live births, and 100 infant deaths per 1,000 live births (Loudon 1992; Meckel 1990). Now, with less than 1% of deliveries occurring in a home setting, maternal and infant mortality rates are considerably lower, with about 12 deaths maternal for every 100,000 live births, and under 7 infant deaths per 1,000 live births (Hoyert 2007; MacDorman and Mathews 2008).

Opponents also seem to view pregnancy and delivery as involving qualitatively different risks than other activities that also involve risks to life and health, and therefore requiring a higher degree of justification. For example, although the risk of a traffic collision is relatively high, most people think it is perfectly appropriate for parents to transport their children—and themselves—in cars. This is the case even if safer alternatives, such as public transportation or walking, are easily available. However, in risk assessments related to pregnancy, often the assumption at work is that any risk to the fetus, however small or theoretical, outweighs considerations that may be of substantial importance to the woman herself (Lyerly et al. 2007, 2009). Value assumptions about what it means to be a good mother, or what sacrifices are reasonable for a pregnant woman to take on, play a significant role on the evaluation of risks, where the attitude seems to be one of “better safe than sorry.”

In contrast, supporters of home birth seem to see pregnancy, labor, and delivery for low-risk women as generally safe activities that can at times be risky. There are many daily activities that involve risk, such as the risk of accidentally falling while using stairs or of choking while eating. While we may take precautions to minimize risks associated with these activities, we are unlikely to think they are best suited to a hospital simply because hospitals are best equipped to handle those worst-case scenarios. Because proponents of home birth don't see the practice as particularly risky, they interpret the evidence as justifying policies that minimize home birth risks, by ensuring, for instance, the availability of well-trained midwives who are able to classify pregnancy risks correctly, or by providing good transportation and referral systems.

Moreover, although proponents are aware that there has been a correlation between decreases in maternal and infant mortality and an increase of hospital births, for them such correlation should not be taken as evidence that childbirth is an activity best suited to the hospital. Rather, they believe that the decline in maternal and infant mortality can be attributed to a variety of factors, such as improvements in sanitation, decreasing birth rates, improved standards of living, and better nutrition, together with medical advancements such as antibiotics and safer blood transfusions. For them, such conditions, and not place of birth, are the relevant factors to consider.

A final source of disagreement between proponents and opponents of home birth is their dissimilar value assumptions about what counts as indicators of optimal care in the case of labor and delivery. While low rates of infant and maternal morbidity and mortality are taken to be indicators of optimal care by both proponents and opponents of home birth, proponents also take the lack of certain obstetric interventions to be an indicator of optimal care, and they believe that such factors ought to be taken into consideration when determining the relative benefits of a particular delivery setting. For proponents of home birth, the significantly higher rates of obstetric interventions that occur in hospital deliveries—such as cesarean section, episiotomy, epidural analgesia, induction of labor, and electronic fetal monitoring (Hutton, Reitsma, and Kaufman 2009; Janssen et al. 2002, 2009; Johnson and Daviss 2005; Lindgren 2008)—are indicators of poor care. Although opponents of home birth recognize that such interventions can contribute to poor maternal and fetal outcomes (Souza et al. 2010), they appear to see these risks as background risks and thus as less relevant when assessing optimal care. Thus, value judgments about optimal care lead each group to interpret the outcomes of homebirth studies differently.

Why It Matters

Although a growing body of literature has called attention to the role of non-epistemic values in science, many scientists still work under the assumption that scientific claims should be kept separate from value judgments, even when the scientific claims are relevant

to informing public policy, and where risk assessment is involved. Presumably, scientists fear that if non-epistemic values are allowed to enter into play, they will lead to bias. Thus, disagreements that arise among scientists are generally thought to be merely empirical or methodological disagreements. While this can sometimes be the case, it is not always so.

We have argued that interpretations of empirical data are tightly bound up with a variety of values judgments. In relation to home births, such value judgments include assumptions about the weight that should be given to worse-case scenarios, whether there are benefits that outweigh such risks, how we should view pregnancy and childbirth, and what should count as optimal care. Failure to attend to the non-epistemic values at stake in interpreting and assessing whether there is evidence for a particular policy can be problematic for several reasons. First, failing to recognize how values underlie judgments about data can impede meaningful communication among scientists. When this happens, it is impossible for the debate to move forward. Proponents of home birth, for instance, offer reasons why we should conclude that home birth is a safe alternative, but these reasons are not recognized as good, or even relevant, by opponents of home birth, because the opponents do not share the same value judgments. Thus, engaging in a discussion about values is crucial to moving the debate forward.

Second, failing to identify and engage with the values at stake in these sorts of debates can lead us down an unfruitful path. Because the disagreement is taken to be solely about empirical and methodological aspects, the frequent conclusion is that we must simply continue to research the issue. Yet more data in itself is unlikely to change the value assumptions that each side relies on to interpret that data. Thus, new studies will do little to move the debate forward or lead to a greater public policy consensus.

Finally, failing to engage in a discussion about the values at stake in these debates is problematic because it may lead to unsound public policy. Good science requires careful attention to the evidence, adequate research methodologies, and suitable questions. But as necessary as all these factors are, they are not always sufficient. For at least some types of research, attention to the value judgments that underlie such research is also essential. If implicit value judgments are not recognized, discussed, or evaluated, there is some chance that the value judgments relied upon will not be rationally supported. If this is the case, then the resulting policies may also be problematic.

Many have argued that the presence of non-epistemic values in scientific reasoning need not lead to bias (Longino 1990, 2002; Solomon 2001). However, we believe that a failure to recognize the relevance of such values in interpreting evidence for science-based policy can be problematic—both for science and for public policy.

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