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# Guardians of our future: New Zealand mothers and sustainable biotechnology

Joanna C. Gamble

In year two of a three-year project, New Zealand mothers of children aged 10 and under were interviewed to examine the social, cultural and spiritual dimensions of biotechnology. Ten focus groups were conducted and used “sustainable biotechnology” as a center-point for discussion, concentrating on four different biotechnology scenarios. The findings of the research were consistent with year one and with findings on the general public throughout the world. Further insights revealed in year two suggested that women saw their and future generations’ quality of life as intimately intertwined with the health of the environment, making the environment particularly important. Because of this, anything that had potentially negative consequences on the ecosystem was perceived to pose a threat to the woman, her family and future generations. The need for strict controls to be put in place by regulatory and research authorities was therefore seen as an important step in allaying her fears. True partnership and participation was seen as critical, since it would only be by such means that mothers would feel they were in control of the safety of their own children.

## 1. Introduction

The New Zealand Government has identified biotechnology as a key priority for New Zealand’s future (Royal Commission on Genetic Modification, 2001). Sustainable success in this area will depend upon understanding the benefits and risks of biotechnology and upon constructive engagement between people in the community and in the biotechnology sector who hold very different opinions regarding the technology. Our research project aims to connect science and society by sharing ideas, perspectives and knowledge through dialogue processes. A greater understanding of underlying values will hopefully lead to improved understanding and communication between laypeople and those involved in development and policy regarding biotechnology.

The research discussed in this paper details the second year of a three-year project led by the Department of Communication Management at the University of Waikato. In 2003 (year one), mothers made up one of five selected community groups interviewed as part of the broader program, “Socially and Culturally Sustainable Biotechnology.” The other four groups were scientists, Buddhists, business people, and the environmentally active (Gamble and Kassardjian, 2008). Discussion centered on a range of biotechnology applications in order to examine underlying values and their relative importance in attitude formation. Mothers of young children shared many

commonalities in their worldviews with Buddhists and environmentalists. Mothers were the least optimistic of the benefits of biotechnology, expressed concern with the unknown long-term consequences on health and the environment, and required strict regulations to control the technology. In addition, they were cynical and resentful of the physical and moral negative impacts that business (financial) considerations had on quality of life and preservation of nature, and expressed feelings of powerlessness, either in terms of being able to accumulate knowledge to inform themselves, or in terms of their impact on decision-making. Nevertheless, if a biotechnology application could be deemed to fulfill a real need, caused no loss of life or suffering, could be contained, and enabled choice on the part of the recipient, the women were willing to accept specific biotechnology applications.

While the focus of the 2003 groups was to understand the relative importance of specific value spheres in determining their perspectives towards biotechnology, the large range of topics included in the study meant that each topic could only be discussed superficially. For future research, we therefore decided to focus on a narrower range of questions to be covered in order to delve more deeply into the underlying values.<sup>1</sup> In the current study we used the concept of “sustainable” biotechnology as a center-point of discussion. Because previous research has indicated that feelings towards biotechnology vary depending on the application (Kassardjian and Gamble, 2005), we discussed perspectives on four selected biotechnology scenarios. The scenarios were chosen to provide some diversity in scope and represented topical issues in the media at that time.

We decided to focus on mothers, since they have traditionally been the main household shoppers, so their influence on the food their family consumes is substantial, making an understanding of their perceptions crucial for anyone involved in the area of biotechnology. In many studies gender has also been observed to play a role (e.g. Hamstra, 1998; Baghurst, 1999) in distinguishing male and female attitudes towards biotechnology. In addition, women have been found to be more concerned with food and health issues (Rozin et al., 1999), including food safety (Gamble and Gunson, 2002). The presence of young children in the home may have an added impact on food choice, because of the potential association with quality consciousness or higher food risk aversion. Parenting may also prompt a focus on nutrition, yielding a search for nurturing benefits through the provision of wholesome foods (Verbeke, 2005). It is expected that such concerns may be greater when children are young and relatively dependent compared with when children are older and freer to make their own choices.

## 2. Method

A recruitment agency was used to enlist 74 women who had at least one child who was 10 years or younger from the Auckland area of New Zealand. Ten focus groups were held at either 1:00 p.m. or 7:00 p.m. over a period of two weeks in February 2005, each lasting around 90 minutes. The groups were conducted at the Mount Albert Research Centre consumer facilities and were led by the same experienced moderator throughout. Groups were videotaped and voice-recorded, and participants were paid for participating.

### *Discussion topics*

Discussion included an exploration of perceptions of biotechnology from a sustainable development perspective. The concept of “sustainability” was defined by the government’s Programme of Action for Sustainable Development for New Zealand (Department of Prime Minister and Cabinet, 2003) as:

development which meets the needs of the present without compromising the ability of future generations to meet their own needs. Achieving sustainable development involves a different way of thinking and working. It requires: looking after people; taking the long-term view; taking account of the social, economic, environmental and cultural effects of our decisions; and encouraging participation and partnerships. (p. 6)

Four scenarios were used as discussion points:

- developing non-transgenic genetically modified plants,
- bioremediation/bioprospecting,
- pre-implantation genetic diagnosis (PGD),
- developing genetically modified pest-resistant trees.

For each of these scenarios, participants were asked to discuss what they saw as the key issues, the values they felt were informing their views, the groups they felt would be most impacted on, and under what circumstances the application could be “sustainable” according to the government definition (i.e. looking after people; taking the long-term view; taking account of the social, economic, environmental and cultural effects of our decisions; and encouraging participation and partnerships). An additional question asked participants to identify which aspects of sustainable development should take precedence in deciding what is an acceptable, sustainable biotechnology (e.g. economic, social, environmental, cultural and/or ethical values). A copy of the discussion questions is available from the author on request.

### *Analysis*

All tapes were transcribed. On completion, a researcher went through the transcripts to identify who the speaker of each comment was, and to check the accuracy of the transcript. The text of the transcripts was entered into Microsoft® Excel 2000 on a question-by-question basis, incorporating group membership and individual number. This allowed development of a coding schedule. Although much literature exists supporting themes typically emerging from qualitative studies on public opinion regarding biotechnology and/or genetic modification, a more inductive approach for development of thematic analysis was taken to ensure new themes or variations of themes were not overlooked. Themes were initially developed on a question-by-question basis. Consistently emerging themes were identified, and each individual comment was then coded using these initial themes. Where a comment did not fit an existing theme, a new theme was added. It became clear during analysis that some themes could cover several questions, or apply at a more general level, and where this occurred was noted. Once a complete coding schedule was developed, the occurrence of each code was calculated. Several repetitions of the same theme by one individual were counted only once. This quantitative step ensured isolated comments or verbose respondents were not given undue emphasis.

## **3. Results**

### *Participants*

The participants were aged 20–51 with a mean age of 36.3 (standard deviation 5.8). Seventy percent indicated their ethnicity as European, while 15 percent identified themselves as Maori or Maori/European, and 14 percent indicated some affiliation with the Pacific Islands. Over half (55 percent) did not belong to any religious affiliation, while 24 percent said they were “Christian” (9 percent specified they were Catholic) and 12 percent were some other

religion. Half of the women were in some form of paid employment, and 40 percent had post-secondary school training.

Typically involvement with the biotechnology debate was low, with nearly three quarters of the women following the biotechnology debate only occasionally or not at all. Most women (88 percent) said they had not participated in any biotechnology events.

### *Developing non-transgenic genetically modified plants<sup>2</sup>*

Sixteen initial comments provided by the women indicated a need for more information, or clarification regarding the procedure. In addition, eight wanted to know the reason for genetically modifying the plants, since this would have an impact on the acceptability of the product. Five women were dubious of the real need for some of the potential developments (such as improved flavor, or better storage characteristics) and saw them as a marketing ploy by big companies to get the consumer to buy more of their products:

We don't have to always think that we need technology to improve our lives. I think we get caught up in this consumer thing, where you have to have an apple that hasn't got a black mark on it.

Ten participants were concerned about unknown long-term consequences on health, four were concerned about antibiotic resistance, and four indicated a need for the crops to be contained as a means of limiting potential negative impacts. However, not all participants saw the scenario in a negative way, with ten participants indicating they felt comfortable with such products since the GM was within the same species.

Six participants revealed that their role as mothers was important in this scenario since they expressed a concern about the health of their children and future generations, and desired an ability to control what their children ate. Unfortunately, six suggested that "healthy" food was expensive, and their food choices were dictated by cost.

From here a dichotomy emerged. On the one hand, five mothers expressed a desire to return to nature, indicating that "natural" was best. Two groups suggested growing their own food as a way of exerting control and taking responsibility for health, but few women actually did this to any extent. On the other hand, five mothers expressed optimism that science could lead to improved qualities in food and hence improved health, and challenged the notion that we should or could control everything in our environment.

The main requirements the mothers in these focus groups had for non-transgenic GM crops to be sustainable were that there was open, honest discussion and partnership during the development of the product (seven participants), and that the crops were contained in a controlled environment or laboratory (six participants). Other issues raised included a need to be proven as safe, a good reason or need for the development, an assurance that the environment would be protected, and having people's best interests at heart, rather than being financially motivated:

Maybe looking after people. I don't see it working for any of the points. It's more about feeding our need for our greed, like, let's just get more of it, let's make it last longer, then we can sell heaps more.

### *Bioremediation*

Of the four scenarios, this was the most acceptable, with 24 women indicating they thought this development would be a good idea, and six felt it was a natural way to protect the

environment. However, the mothers also asked many questions indicating a need for more information regarding how the fungus was grown and collected, the likely impact on the kauri trees and the environment, and the potential impact on the environment and food chain. Thus in terms of an immediate response, the environment was of the greatest concern to the mothers.

Concerns for children's health or that of future generations were also revealed to be important. Although in one respect, the women felt that the bioremediation scenario could help improve the quality of soil in which their children played (three comments), they were more likely to be concerned about unknown health effects related to the fungus (12 comments).

Four women appeared to be optimistic and trusting about science, stating they felt a bioremediation fungus would help to clean up the land for future generations, and believed that the development would have been well researched before being released into the environment. However, for a number of participants (11 comments), feelings of consumer alienation were apparent (Allison, 1978), reflected by comments of feeling distrustful of overseas companies' motivations and irresponsibility toward the natural environment:

The accent is on exploit. It's like oh! Does that mean it will be like the rain forests? When I read that, it sounds good at the beginning and then when you get down to the "exploit" I think "hmmm". It feels like you're going to be used for what little money you can get now, as opposed to really thinking it's sustainable development.

Finally, in a related way, one group of women indicated they felt vulnerable and disempowered by their lack of understanding of the process (five comments), and their dependence on authorities that they did not know whether to trust (three comments):

People are saying things for their own ends aren't they, especially this topic. I think people tend to put their trust in people, or believe in what people are saying because there is [the need for] a huge level of understanding.

The women were asked what they required for this development to be sustainable in New Zealand. The first criterion was that it minimized impacts on the environment, which involved not harming the kauri tree (four comments), controlling removal of fungus (three comments), and ensuring the fungus was contained (two comments). The second criterion was that the technology was proven to be safe and effective (seven people). The third criterion involved the issue of ownership. New Zealand should ensure it retained the majority of control, perhaps with the involvement of the government, while the role of overseas companies should be limited (13 comments).

### *Pre-implantation genetic diagnosis (PGD)*

Not surprisingly, the scenario regarding PGD was the development that elicited the greatest amount of comment, and it was on this issue that the greatest degree of polarity was revealed. A commonly agreed opinion was that it should be the personal choice of the parents to have, or not have the procedure (16 comments were related to right to opinion, seven to having a choice, and six were related to having to be in the situation to judge):

I think everyone has their own opinion on it. It would be depending on whether you could have a child or not anyway ... It's a personal thing. We all thank God that we've got two lucky children now who are healthy and well. I don't know what I would feel like if one of them had a disorder, or something like that. I think that's a very personal thing that everyone has their own opinion on.

Another issue of concern to 17 women was who decided which conditions were “serious,” and where the line should be drawn (referred to as the “slippery slope”). It was at this point that opinions began to diverge. While it was agreed that attempts to create “super-babies” or “designer babies” were obviously unacceptable, 11 women felt the procedure was a valuable tool to prevent unnecessary suffering (seven comments) and ensure the well-being of children (four comments):

It says “serious inherited genetic conditions”. Like you were just saying, what is classed as serious? How are the guidelines going to be broadened over the years to say your family had a cancer gene? You’re not worthy of living because you’re going to end up with cancer. You’re not going to get a choice.

If you’re a woman and you’ve got serious genetic conditions in your family, and there is a risk, say you’ve had two children with some kind of disease, and you might have already had one and had a miscarriage or whatever, I think that for someone that wants a child, and wants a healthy child, I’d say that would be great. I think there’s enough trouble in the world without having ... I think there should be an age limit on it. It should be for genetic conditions. I don’t believe in the whole area of picking the sex of your child.

Some women felt that all life was valuable regardless of the disabilities possessed by the child, and four said that parents should count themselves lucky to have any child. In addition, a couple of women had cultural, ethical or religious issues with the procedure, with the belief that nature (or God) would ensure the survival of those who were “meant” to survive (ten comments). However, this was complicated by the fact that four women had an issue with *in vitro* fertilization in the first place. Two women felt that those at risk of producing children with severe inheritable diseases or disabilities should adopt children rather than having their own.

While three people believed that the procedure of PGD was ethically or morally wrong, and would therefore never be sustainable, the main criterion for those who were more accepting of it was that there was a trustworthy ethics committee and strict international guidelines (five comments). In addition, they required that the procedure only be available to those who had a high risk of passing on a serious inheritable disease rather than to make “designer babies” (12 comments). Five comments suggested that assessment needed to be on a case-by-case basis.

### *Developing genetically modified pest-resistant trees*

Initial discussion about GM pest-resistant trees typically focused on spraying (29 comments) and its negative impacts. When asked to indicate their preference of spraying or GM trees, ten women commented that prevention was the answer and they would rather have better border control. Alternatively, five women felt sure there must be more natural alternatives to either spraying or GM crops.

A need for more information regarding the development was also apparent, including questions such as “how would it work?,” “where will they be grown?,” “what’s in the GM trees, would they be harmful or taste bad?” Four women initially felt the development was a good idea, or at least preferable to the spraying, particularly in the pine trees, although they had reservations about actually eating GM fruit. Also, there were many women who had questions regarding the unknown impacts on the environment, such as an impact on native species, or on the food chain in general (nine comments). In addition, three participants were concerned about the possibility of insects developing resistance, and five women commented that there would always be a new species of pest to worry about, thus requiring many types of GM plants:

If they're going to GM fruit trees, how is that going to affect the fruit in the long run as well? Our children are going to be in the next generation and they will be eating the fruit.

Another super bug might come along. Can you actually, you know, we think again that the human race can just eradicate this, do away with that, but can we actually do that? That's the big thing. Okay we get rid of this, but there will be the next thing lining up probably.

Seven women indicated that they felt the scenario was not acceptable or sustainable. However, for most women two main requirements were raised in order for the scenario to be sustainable: that it looked after people (i.e., was proven safe (nine comments) and was done for good reasons (one comment)); and that it did not adversely affect the environment (specifically the soil, water and food chain) (eight comments). In addition, several women required long-term monitoring, with the results made available to everyone (five comments).

#### *Which aspects of sustainable biotechnology should take precedence?*

A large number of comments (17) focused on the importance of considering people, whether from an ethical standpoint, or a cultural one, or whether it was simply looking after people (including health and safety). However, there was the recognition that although it was important to take everyone's beliefs and values into consideration, it was a difficult task to decide whose values should take precedence:

And respect really, I guess. No matter what, if you go back to looking after people again, no matter what their social, or economic culture beliefs are, again if you've listened to what those are too, you are taking care of hopefully everybody's needs too and respecting.

Eight comments indicated that the environment was also extremely important, with some women noting that a healthy environment was necessary for our own health:

I think environmentally. If your land is crap and you can't live on it anymore. If you're poisoning yourself and your future generations, what good is money going to do for you? We'll end up like those people over in starving countries, with no land to grow crops on.

Seven women were resentful of what they saw as the overemphasis on economic considerations.

While looking after people and the environment were particularly important for many women, seven felt that cultural, environmental, economic and social aspects were all interrelated, and that a balance across these was necessary and desirable. Alternatively, six women felt that the situation being considered would influence which aspect should take precedence.

## **4. Summary and discussion**

The findings from the current stage of the research are consistent on a number of points with the perspectives of the women interviewed for the previous stage of the research (Gamble and Kassardjian, 2008), and with findings on the general public throughout the world (NFO, 2003; Henderson and Weaver, 2003; Dietrich and Schibeci, 2003; KRC Research, 2003; Shaw, 2002).

*Important values*

Values are defined by Vaughan and Hogg (1998: 95) as “a higher order concept thought to provide a structure for organising attitudes.” Cultural values “represent the implicitly or explicitly shared abstract ideas about what is good, right, and desirable in a society” (Schwartz, 1999: 25). Researchers over the past 25 years have formulated theories about societies (or countries) to enable them to predict the behavior of that society (although not to predict the behavior of a specific individual). While Hofstede made one of the first major steps towards developing a theory of universal values, published in 1980, a number of criticisms have been made. Since then, Schwartz (1994) has been perhaps the most commonly cited rival to Hofstede’s system. In Schwartz’s study, the spatial relationships between 56 values were analyzed and found to be very consistent with each other across countries, suggesting they could be summarized as falling within ten domains, which he called motivational “value-types.” These ten motivational types relate to each other on two bipolar dimensions (Schwartz, 1994; Schwartz and Boehnke, 2004). Dimension one (self-enhancement versus self-transcendence) contrasts the motivational types of values of universalism and benevolence (which call for the transcendence of selfish personal interests), with those of power and achievement (which justify the pursuit of self-enhancing goals). Dimension two (conservation versus openness to change) contrasts the motivational types of values of conformity, tradition and security (which emphasize conservation of the status quo), with those of stimulation and self-direction (which emphasize openness to change).

Using this framework as a basis for interpretation, the women we interviewed quite clearly demonstrated the values such as understanding, appreciation, tolerance and protection for the welfare of all people and for nature (universalism), and preservation and enhancement of the welfare of people with whom one is in frequent personal contract (benevolence) which typify the “self-transcendent” pole of dimension one. However, a separation between the mothers appeared in terms of dimension two. For instance, in scenario one (GM crops) some women had values that reflected tradition and security (which lie closer to the conservation end of dimension two). Other mothers were better described by values reflecting a desire for excitement, novelty and challenge in life (stimulation) which appear closer to the openness to change end.

The scenario of PGD created a particularly interesting discussion, since it was highly relevant to being a mother. The value of all life came through very strongly, and it was unanimously agreed that perfection should never be the goal of the procedure, with the selection of children for their gender or physical attributes seen as morally abhorrent. Additionally, those with any sort of disability were seen to be valuable members of society. However, it was also very important that a woman had a right to choose to be involved with or affected by biotechnology regardless of whether the participant thought it was morally right to be involved or not. Thus while some women felt strongly that PGD was not right, they were reluctant to say it should not be used in any circumstances, since they recognized that they could not and should not put themselves in the position of those who might need the procedure. In addition, it was generally agreed on that PGD should be made publicly available to everyone with a high risk of passing on serious inheritable conditions rather than only to those who were wealthy enough to afford it. Such beliefs reflect the shared emphases between expressing reliance upon one’s own judgment, comfort with the diversity of existence, the enhancement of others and transcendence of selfish interests.

*Conclusions*

Because the environment is so closely linked to society, anything that has potentially negative consequences on the ecosystem is perceived to pose a threat to the woman, her family and

future generations. Economical considerations may be perceived to be serving those who hold opposing values (such as power and self-enhancement), and may therefore be considered of lesser priority, or indeed strongly rejected (especially if those outside entities are perceived as threatening). The strong fear of unknown, long-term consequences on health and the environment is likely to reflect the desire for a mother to ensure she can protect her offspring from harm both now and in the future. The need for strict controls to be put in place by regulatory and research authorities is therefore seen as an important step in allaying their fears. However, true partnership and participation is a critical aspect of this regulation, since it is only by such means that mothers will feel they are in control of the safety of their own children and future generations. The mothers in this project indicated they found the information provided to be interesting, and felt better informed upon leaving. They have also been very generous in detailing their perspectives on biotechnology, and it is hoped that those involved in development and policy regarding biotechnology will find the research helpful in improving their understanding of a large segment of society that has concerns with biotechnology. Thus in terms of the relationship between science and society, we trust that the insights provided by this research may contribute to the learning of each other's "language" and the finding of common ground.

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### Notes

- 1 Different researchers focused on different groups in society with which they had a degree of familiarity (e.g. Maori issues). Future publications regarding this research will cover differences in findings between the various groups.
- 2 A detailed account of the scenarios provided to the participants can be obtained from the author.

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