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Contemplating choice: attitudes towards intervening in human reproduction in Sri Lanka

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ABSTRACT *To date, relatively little is known about the ethical, legal and social responses to recent advances in reproductive and genetic technology outside of Europe and North America. This article reports on a survey carried out among doctors (n = 278) and medical students (n = 1256) in Sri Lanka to find out more about their responses to novel interventions in human reproduction such as In-Vitro Fertilization, Pre-Implantation Genetic Diagnosis and genetic engineering. In the first part of the paper comparisons are drawn between this survey and a survey carried out in 1985 which also considered issues surrounding amniocentesis and therapeutic termination. The second part of the paper deals with more recent developments. The analysis reveals high levels of support for the use of new technologies in treating infertility and identifying genetic disorders. However, differences are apparent among the major religious communities represented in the sample and these are particularly in evidence in relation to pre-natal genetic diagnosis. An important theme throughout both surveys is the continuing tension surrounding State policy on termination of pregnancy and the implications this has for the development of screening and counseling services where genetic disorders are concerned.*

Introduction

Over the last 40 years considerable strides have been taken in the fields of embryology, cryopreservation and molecular genetics. The interventions that these developments make possible have progressively reframed the process of human reproduction: what was once left to chance, fate and destiny is now increasingly informed by expectations of choice, selection and determination. Much effort is currently expended on pin-pointing the ethical, legal and social conflicts created by these advances and thereby offering grounds for embracing or rejecting such 'progress' in the interest of the greater good. To date, the extensive debate and deliberation on these issues has largely been conducted with Euro-American societies, moralities and individuals in mind (e.g. see Dickenson, 2002). Yet, developments in the manipulation and diagnostic testing of early

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human life and the ethical Pandora's box that this opens is not just for Western doctors to ponder. The globalisation of markets in health care and health technologies combined with rapid development of computer and information technology means that new techniques are diffused quickly and easily (see WHO, 2002).¹ As the interventions that these technologies make possible become more visible in the developing world, ethical deliberation begins to emerge which draws on other cultures and histories than those that have dominated the Western world (see Tan Alora & Lumitao, 2001; De Castro, 1999; Simpson, 2004a, 2004b). In this paper we set out to explore the issues that are raised for medical professionals once they begin to grapple with the ethical issues that arise as interventions in human reproduction become more invasive, predictive and definitive.² In our discussion, we highlight some of the distinctively local ethical, legal and social issues that arise for present and future medical practitioners as they reflect upon the move from chance to choice in the management of human reproduction (see Dissanayake, Simpson & Jayasekara, 2002).

Context

Sri Lanka is a 'Democratic Socialist Republic' of some 19 million people. The Island has considerable ethnic and religious diversity. The main ethnic groups are Sinhalese (74%), Tamils (19%) and Moors (7%) with smaller groups such as Malays and Burghers accounting for less than 1%. In terms of religious affiliation the main groupings are Buddhist (69.3%), Hindu (15.5%), Moslem (7.6%), Roman Catholic (6.9%), and Christians (0.7%). The largest communities within Sri Lankan society at present are Sinhala Buddhists (approx. 69% of the population) and Tamil Hindus (approx. 15%). In relation to other countries in the South Asian region, Sri Lanka has a favourable gross national product (GNP) per capita (US\$820), a very high rate of literacy (estimated to be over 90%) and a free public health sector with reasonable access. Since economic liberalisation in the 1980s a mixed economy of health care delivery has developed with a much-expanded private sector now in operation. In both sectors the transfer of new medical knowledge and technical expertise has been both rapid and pervasive despite overall government expenditure on health care being only 1.7% of the GNP (Department of Census and Statistics, 2001). The increasing visibility and use of new technologies in Sri Lanka has prompted a variety of concerns about how best to respond politically, economically and morally in the face of these powerful and pervasive developments. For example, in the field of genetics and assisted reproduction, a working group has recently drawn up a national bioethics statement at the request of the National Science and Technology Commission (NASTEC, 2003; also see Simpson, 2001). Similarly, the establishment of a Twin Registry in 1997 resulted in some important proposals regarding the principles of regulation in the field of genetics and biodata (Sumathipala *et al.*, 2000). The data presented in this paper is intended to contribute to the debates that are currently unfolding around the assessment and assimilation of advanced biotechnologies in contemporary Sri Lanka.

Background

The research on which this paper is based is a collaboration between the authors that has taken place over a period of two years. The survey we report on here was the foundation of this collaboration and was conceived with two broad aims in mind. The first was to replicate elements of a survey carried out in 1985 (Jayasekara, 1986, 1989; Jayasekara, Kristl & Wertelecki, 1988). That survey ascertained attitudes towards genetic counseling, amniocentesis and therapeutic abortion among doctors ($n = 302$) and students ($n = 143$). The survey was initiated in response to a suggestion made at that time by the Task Force advising the National Conservation Strategy. In broad terms, general improvements in child health had brought the problem of genetic disease more into focus and it was felt that a more effective genetic programme ought to be developed for the Country. Then, as now, approaches to pre-natal testing and genetic counseling were closely related to policies regarding the termination of pregnancy. Repeating questions from that survey in the present one enables us to provide a limited comparison of the views of doctors and students over a period of fifteen years. The second aim was to focus on more recent developments in assisted reproduction such as IVF, Artificial Insemination by Donor (AID) and pre-natal genetic diagnosis (PGD) as well as cloning and cryo-preservation in order to establish what contemporary trends and views were among doctors and medical students. Prior to carrying out this survey a small pilot study was carried out in summer of 2000 (Dissanayake *et al.*, 2002).

Sample and method

Self-administered questionnaires were distributed at lectures given by the two local collaborators to medical students at the Faculty of Medicine and to doctors at the Post-Graduate Institute of Medicine. A total of 278 questionnaires were completed by specialist doctors who came from all over the Island for post-graduate courses (see Table 1). As all doctors who attended the courses filled in questionnaires the response rate is believed to be 100%. Likewise all students who attended lectures were given questionnaires to fill in. Out of the 1256 questionnaires collected from the students 13 were returned unfilled in (1%).

The age of the doctors ranged from 27 to 60 with a mean of 34 years. Of the doctors 67% ($n = 179$) were male and 33% ($n = 89$) were female. Of these, 71% ($n = 190$) were married and 29% ($n = 78$) were unmarried. Among the unmarried doctors a slightly higher proportion were male. Half of the doctors did not have any children, 23% had one child and 22% had two. In terms of religious affiliation the distribution broadly reflected that of the wider population with Buddhists being in the majority and slightly over-represented at 75%.

Of the students in the sample, ages ranged between 19 and 34 with a mean age of 23. Males were slightly in the majority at 57% ($n = 682$). As might be expected in Sri Lanka, it is unusual for young people to marry and have children before they have completed their tertiary education. Consequently, only 1% ($n = 12$) of the

TABLE 1. Doctors' primary field of specialisation

<i>Doctors' primary field of specialisation</i>	<i>Percentage (number)</i>
Obstetrician/Gynaecologist	15 (41)
Dentists	5 (15)
Surgeons	16 (44)
Administrators	4 (12)
Physicians	28 (77)
Ophthalmologists	8 (22)
Family practitioners	17 (47)
Paediatricians	7 (20)
Total	100 (278)

students were married and of these only four had children. In terms of religion the sample was biased in terms of Buddhists with over 87% of students identifying themselves as such.

In the questionnaire, doctors and students were asked to state whether they agreed or disagreed with 25 statements about new reproductive and genetic technologies. At the end of the questionnaire respondents were invited to put written comments on any issues that had been raised for them by the statements in the questionnaire. As the survey is a preliminary stage in a wider and more in-depth study of how the new technologies are being received it was decided that a step-wise regression analysis would be used. In other words, rather than testing a hypothesis as such, we sought to highlight significant variables that would provide a quantitative basis for reflection upon more complex issues of religion, culture and ethnicity. Use of this technique would also enable us to make limited comparisons with the earlier survey which also used regression analysis. To this end SPSS was used to undertake a stepwise multiple logistic regression analysis of the 2002 survey with the attitudes of doctors and students taken as dependent variables and demographic factors identified above as the independent variables. The independent variables included in the equation were as follows: status (whether respondents doctors or students taken as a proxy for age), religion, sex, marital status, number of children, whether genetics was studied during medical training and whether they were aware of the existence of the Human Genetics Unit.³

Pre-natal diagnosis and the termination of pregnancy debate

At the present time termination of pregnancy is strictly illegal in Sri Lanka; it is only available where a mother's health is directly threatened and three physicians are prepared to sign a form to this effect. Whilst there are no official figures for the current abortion rate, unofficial estimates put the number of terminations in the region of 700–1000 per day (De Soysa, 2000, p. 46). The majority of terminations appear to be sought by older married women for whom contraception has failed (Gunasekera & Wijesinha, 2001).

Even though the law on termination of pregnancy was changed in 1995, reforms stopped far short of the more liberal approach to abortion demanded by many campaigners. Attempts to modify the Penal Code so that termination of pregnancy was available in cases of rape, to unmarried mothers, in cases of incest or where there are fetal abnormalities proved unsuccessful. Attempts by women's groups and some branches of the medical profession to change the law have, to date, had little overt success although the pressure for a change in the law remains strong. In Sri Lanka today, questions regarding the availability of genetic counseling and pre-natal diagnosis are closely linked to the termination of pregnancy issue as many see the former as pointless if it is not accompanied by the legitimate option of the latter.

Compared with the earlier survey, doctor's responses to the three questions regarding the use of amniocentesis would appear to be rather less positive (see Table 2). In the 1986 survey, 94% of doctors felt that amniocentesis significantly affects the potential usefulness of genetic counseling whereas in the present survey

TABLE 2. Attitudes towards prenatal diagnosis and therapeutic abortion

	<i>% giving positive response</i>	
	<i>Doctors</i>	<i>Students</i>
Amniocentesis significantly affects the usefulness of genetic counseling	73% (203) (94)*	80% (1008) (75)*
Amniocentesis is a good idea if a genetic disorder like Down's Syndrome has already appeared in the family?	87% (242) (98)	87% (1093) (89)
Amniocentesis should be offered to all pregnant women over the age of 35 years if there is legal provision for therapeutic abortion?	71% (198) (78)	78% (976) (72)
Amniocentesis should be offered to satisfy prenatal curiosity about the sex of the fetus?	11% (30) (30)	27% (338) (32)
If by amniocentesis a gross genetic defect was detected an abortion might be appropriate?	93% (259) (89)	81% (1013) (69)
Using pre-implantation genetic diagnosis (PGD) is an acceptable way to screen for genetic disorders?	65% (181)	70% (878)
If yes, to previous question: If abnormalities are identified through PGD it is acceptable to discard the embryos?	84% (232)	80% (1000)
There should be provision made in the Law to carry out a therapeutic abortion when a genetic defect is detected ante-natally?	87% (239) (96)	80% (1009) (88)

Note: Figures in *italics* are the percentages reported for doctors and students respectively in the 1986 survey.

only 73% answered positively. Likewise in relation to its use where there are already genetic disorders or the mother is older than 35 years the proportions were lower (98% as compared to 87% and 78% as compared to 71 % respectively). The reason for this difference may in part be explained by the emergence of more sophisticated forms of ultrasound scanning which obviate the need for invasive tests carrying greater risks. There may also be a futility factor at work given the continued illegality of abortion in Sri Lanka. As one doctor put it in a written comment: 'unnecessary expenditure as you can't change or do anything with your findings', and another commented: 'no point doing amniocentesis when therapeutic abortion is not legalised'. Student responses are broadly similar between the two surveys.

Step-wise multiple regression analysis in relation to these three questions in the 2002 survey (Table 3) revealed that Protestants ($p = .001$) were the most likely to feel that amniocentesis significantly affects the usefulness of genetic counseling with Hindus showing the least positive responses to the question. Unmarried people ($p = .045$), the majority of whom were in any case likely to be students, were more likely to advocate the use of amniocentesis in cases where Down Syndrome already exists in the family. The decision to offer amniocentesis to women over the age of thirty five was positively associated with students ($p = .002$), all the religious groupings (except Moslems) ($p = .013$) and women ($p = .023$). Step-wise multiple regression analysis carried out on the responses of physicians in the 1985 survey revealed age, presence of children and having taken a genetics course to be significant variables in their responses regarding amniocentesis and the usefulness of genetic counseling. Age was also a significant variable regarding the use of amniocentesis where women are over 35 (Jayasekara *et al.*, 1988, p. 4). Analysis of student questionnaires collected in the 1985 survey did not reveal any significant relationships between these questions and the demographic variables (Jayasekara, 1986, p. 70).

Concerning the use of amniocentesis to satisfy curiosity about sex, both surveys suggest doctors and students had strong views opposed to this practice. In the 2002 survey, 88% of doctors were against using amniocentesis for this purpose and among students 70% were against. The paediatricians in the sample without exception expressed their opposition to fetal sexing ($n = 20$). Among doctors, the proportion supporting this usage of amniocentesis was much less than in the earlier survey with 30% answering positively in 1986 and only 11% answering so in the present survey. The difference in the student populations on this question had moved in the same direction but was not so marked (32% in 1986 compared with 27% in the present survey). It is interesting to note that comparing these two samples suggests a move away from approval of fetal sexing which is in the opposite direction to that reported by Wertz and Fletcher (1998, p. 262) for many of the 37 nations they surveyed. Asking geneticists and genetic counselors about preferred courses of action in different scenarios, Wertz and Fletcher reveal a general shift toward a greater willingness to use pre-natal diagnosis for fetal sexing in the period 1985 to 1994. They surmise that this trend may be explained by a widespread shift in favour of acknowledging parental

TABLE 3. Variables associated with attitudes of doctors and students towards prenatal diagnosis and therapeutic abortion in 2002 survey

	<i>Status (doctor/ student)</i>	<i>Religion</i>	<i>Sex</i>	<i>Marital status</i>	<i>Number of children</i>	<i>Awareness of Human Genetics Unit</i>	<i>Genetics studied at medical school</i>
Amniocentesis significantly affects the usefulness of genetic counseling		p = .001 ^a					
Amniocentesis is a good idea if a genetic disorder like Down's Syndrome has already appeared in the family?				p = .045 ^b			
Amniocentesis should be offered to all pregnant women over the age of 35 years if there is legal provision for therapeutic abortion?	p = .002 ^c	p = .013 ^d	p = .023 ^e				
Amniocentesis should be offered to satisfy prenatal curiosity about the sex of the foetus?	p < .001 ^f		p < .001 ^g			p = .002 ^h	
If by amniocentesis a gross genetic defect was detected an abortion might be appropriate?		p = .003 ⁱ		p < .001 ^j			p = .020 ^k
Using pre-implantation genetic diagnosis (PGD) is an acceptable way to screen for genetic disorders?							
If yes, to previous question: If abnormalities are identified through PGD it is acceptable to discard the embryos?		p = .001 ^l			p = .022 ^m		
There should be provision made in the Law to carry out a therapeutic abortion when a genetic defect is detected ante-natally?				p = .010 ⁿ			

Note: Positive responses associated with being: ^aProtestants; ^bunmarried; ^cstudents; ^dHindus; ^ewomen; ^fstudents; ^gmen; ^hwithout awareness of the Human Genetics Unit; ⁱHindus and Buddhists; ^jmarried; ^khaving studied genetics at medical school; ^lHindus and Buddhists; ^mthose with two or more children; ⁿmarried. All other associations non-significant (p < .050).

choice in reproductive matters. In Sri Lanka, however there remains a strong antipathy towards pre-natal diagnosis to satisfy curiosity about sex as this might tempt some parents to seek termination of pregnancy where female children were being carried. Such a notion is felt to be repugnant in a country where women's status is relatively high and female children are held in high esteem. Among doctors, Roman Catholics and Protestants were the most averse to this practice with Moslems being least averse, although it must be said that the numbers of Moslem doctors in the sample is small ($n = 3$) and therefore this inference is somewhat questionable. Among the students, once again Protestants were most likely to object whereas Moslems were least likely. In the multiple regression analysis, however, religion did not feature as a statistically significant variable (see Table 3). The analysis revealed that students ($p < .001$), men ($p < .001$) and those without awareness of the Human Genetics Unit ($p = .002$) were most likely to feel that offering amniocentesis for fetal sexing was appropriate suggesting that a combination of inexperience, gendered interest and lack of awareness may play a part in forming this view.

Among doctors, the proportion in favour of termination of pregnancy in circumstances where there was a gross genetic defect was broadly similar in the two surveys. Of the doctors 93% ($n = 259$) supported termination of pregnancy in such cases compared with 89% in the earlier survey (also c.f. De Silva *et al.*, 1997). All of the family practitioners in the current sample expressed support for this line of action ($n = 47$). Students appeared a little less pro-termination of pregnancy than doctors, but comparison between the two samples indicate a much higher level of acceptance across the two surveys (81% in the present sample as opposed to 69%). Multiple regression analysis revealed that the respondents most likely to agree with the statement advocating therapeutic termination were Hindus and Buddhists ($p = .003$) and those who were married, that is, doctors and not students ($p < .001$).

Consideration of PGD in relation to screening and possible termination of pregnancy revealed that among both doctors and students approximately one third were either against or undecided on the use of PGD for screening. The proportions in favour were 65% of doctors and 70% of students. However, if PGD did identify a genetic abnormality then discarding the embryos was acceptable among 84% of doctors and 80% of students. One possible interpretation of this discrepancy is that whereas there is some ambivalence over the PGD procedure in terms of safety and cost, there is rather less ambivalence on what to do with the results of PGD where these indicate an abnormality. Multiple regression analysis revealed that, as for the previous question, Hindus and Buddhists ($p = .001$) and married respondents ($p = .022$) were the most likely to accept the discarding of embryos.

On the question of changing the law to allow termination in cases where there are genetic defects, 87% of doctors and 80% of students were in favour. These figures are of similar order to responses given in the 1986 (96% and 88% respectively). However, written comments suggest that among doctors and students there was a solid core of respondents drawn from each of the religious communities who

were strongly opposed to allowing termination in these circumstances. Protestants appeared to be the most opposed with 31% ($n = 4$) of all Protestant respondents against a change. Next most opposed were Moslems (29%, $n = 7$), Catholics (19%, $n = 19$) and Buddhists (14%, $n = 178$). The group least opposed were the Hindus with only 10% ($n = 9$) of all Hindus opposed to such a change. The only significant variable identified in the regression analysis was marital status. Married respondents were more likely to favour a change in the law regarding therapeutic abortion ($p = .010$).

Assisted reproduction

In Sri Lankan society, infertility is not only a source of distress but also a source of great social stigma. As yet there are few legitimate social roles available to those who are unable to have children or consciously opt not to do so. Once a marriage takes place there are familial expectations that a pregnancy will shortly follow. Under such circumstances it is not surprising that in Sri Lanka, as in India (Bharadwaj, 2003) the various forms of assisted reproduction have been positively received and encouraged. Previously these services could only be accessed by those who could not only afford the treatment but were able to find funds to travel to India, Singapore or Europe. Over the last four years, although still unaffordable for the vast majority of Sri Lankans, access to such services has been made a little easier by offering services locally. The first IVF child was born on Sri Lankan soil in November 1999 using a local team assisted by British embryologists. The first IVF child to be born using an entirely local team was reported in the news in July 2002. More advanced techniques such as Intra cytoplasmic sperm injection (ICSI) still require technical support from foreign teams but will become entirely locally managed in the near future. Comparisons are currently being drawn in some quarters between the costs of an IVF cycle (approximately 300k Rs) and the cost of a kidney transplant with the implication that the costs are not exorbitant in relation to other 'hi-tech' treatments currently available. It is argued that, as with kidney transplants, some support should be made available via the public health sector to couples who would benefit from assisted reproduction. Attempts are currently being made to enable couples to access IVF in public sector hospitals.

Among both doctors and students there was a high degree of support for the new technologies in overcoming infertility (96% and 90% respectively) (see Table 4). Regression analysis indicated that support was significantly correlated with being a doctor ($p = .002$), being aware of the Human Genetics Unit ($p = .020$) and having studied genetics at medical school ($p = .024$) (see Table 5). Doctors and students had little problem with the idea of artificial insemination by husband (AIH) (96% and 85% respectively). The idea of using donor sperm was far less acceptable to both groups with 67% of doctors and 60% of students in favour. Likewise, embryo donation was not universally supported with 61% of doctors and 53% of students in favour. Egg donation was felt to be rather more acceptable than sperm and embryo donation with 72% of

TABLE 4. Attitudes towards the new reproductive technologies

	% giving positive response	
	Doctors	Students
New technologies which involve the manipulation of sperm, eggs and embryos outside the body are acceptable methods to overcome infertility?	96% (266)	90% (1128)
Artificial insemination by husband is an ethically acceptable way to achieve conception?	96% (268)	85% (1071)
Artificial insemination using donor sperm is an ethically acceptable way to achieve conception?	67% (185)	60% (752)
Egg donation is an ethically acceptable way for a woman to achieve a pregnancy?	72% (200)	65% (815)
Embryo donation is an ethically acceptable way for a woman to achieve a pregnancy?	61% (170)	53% (659)
The use of surrogate mothers is an ethically acceptable practice for couples who are infertile?	49% (137)	50% (622)

doctors and 65% of students in favour. It is interesting to note that substitution of male gametes, which involves relatively simple procedures, is generally less acceptable than the substitution of female gametes, which is a far more complex and intrusive operation. That egg donation should be the most acceptable of these techniques is perhaps a reflection of the cultural significance of semen in determining descent and inheritance. In other words, techniques which result in children carrying genetic material from someone other than the mother's husband would seem to be the more problematic than ones where another woman's genetic material is involved. Surrogate motherhood was the least acceptable means to achieve parenthood with only 49% of doctors and 50% of students expressing approval for the practice.

Although there was some indication of a broad prioritization of transactions in gametes and embryos, the regression analysis indicated significant differences between men and women. Men were more likely than women to favour AID ($p < .001$), egg donation ($p = .005$), embryo donation ($p = .038$) and surrogacy ($p = .003$) (Table 5). There were also positive correlations between having studied genetics and approval of AID ($p = .032$), egg donation ($p < .001$) and embryo donation ($p = .006$).

New technologies and the future

Unlike assisted reproductive technologies, developments in molecular genetics as they relate to reproduction are some way off in Sri Lanka. Whereas, the use of recombinant DNA technology for paternity testing and for forensic purposes (Goonasekera, Gunasekera & Fernandopulle, 1999) has been available for some

TABLE 5. Variables associated with attitudes of doctors and students towards new reproductive technologies in 2002 survey

	<i>Status (doctor/ student)</i>	<i>Religion</i>	<i>Sex</i>	<i>Marital status</i>	<i>Number of children</i>	<i>Awareness of Human Genetics Unit</i>	<i>Genetics studied at medical school</i>
New technologies which involve the manipulation of sperm, eggs and embryos outside the body are acceptable methods to overcome infertility?	p = .002 ^a					p = .020 ^b	p = .024 ^c
Artificial insemination by husband is an ethically acceptable way to achieve conception?	p < .001					p < .001 ^e	
Artificial insemination using donor sperm is an ethically acceptable way to achieve conception?	p = .017 ^f	p = .017 ^g	p < .001 ^h				p = .032 ⁱ
Egg donation is an ethically acceptable way for a woman to achieve a pregnancy?	p = .023 ^j		p = .005 ^k				p < .001 ^l
Embryo donation is an ethically acceptable way for a woman to achieve a pregnancy?	p = .002 ^m		p = .038 ⁿ				p = .006 ^o
The use of surrogate mothers is an ethically acceptable practice for couples who are infertile?			p = .003 ^p				

Note: Positive responses associated with being: ^adoctors; ^bhaving awareness of Human Genetics Unit; ^chaving studied genetics at medical school; ^ddoctors; ^e having awareness of Human Genetics Unit; ^fdoctors; ^gHindus and Buddhists; ^hmen; ⁱhaving studied genetics at medical school; ^jdoctors; ^kmen; ^lhaving studied genetics at medical school; ^mdoctors; ⁿmen; ^onot having studied genetics at medical school; ^pmen. All other associations non-significant (p < .050).

time, the use of such technologies for the purposes of testing and screening for genetic diseases is not yet available. Where genetic testing is carried out, the samples are usually shipped abroad (e.g. De Silva *et al.*, 2000). However, it is expected that such testing will become widely available in the near future with the setting up of several laboratories capable of carrying out genetic testing.⁴ Although genetic engineering and cloning are remote by any standards, they are nonetheless global in their potential consequences. Judging by the comments made about these techniques in our questionnaires, the debates over the use and misuse of such technologies have not been missed by doctors and medical students in Sri Lanka. Similarly, the prospect of cryo-preserving sperms, eggs and embryos, which opens up the possibility of delaying reproduction for medical or purely social reasons, is a subject of great interest.

Whereas therapeutic cloning for the creation of organs for transplantation received a reasonably high degree of approval (84% of doctors and 81% of students respectively), the use of cloning for human reproduction was considerably less well received with 40% of doctors in favour and only 25% of students in favour (see Table 6). The regression analysis revealed that doctors ($p < .001$), Hindus and Buddhists ($p = .041$), men ($p < .001$) and those with awareness of the Human Genetics Unit ($p = .009$) were more likely to consider cloning ethically acceptable to overcome reproductive problems (see Table 7). Even though the level of support for human cloning is low when compared to therapeutic cloning the figures are still relatively high given the aversion to human cloning that has been expressed by governments throughout the world. The freezing and storing of gametes was given a high level of support (80% of doctors and 70% of students), however, when it came to using gametes for posthumous conception the proportions drop significantly (62% of doctors and 54% of students). The prospect of genetic engineering received high levels of approval

TABLE 6. Attitudes towards future developments

	% giving positive response	
	Doctors	Students
Cloning of human beings may be an ethically acceptable means of overcoming reproductive problems in the future?	40% (111)	25% (312)
Cloning of body cells may in future be an ethically acceptable way of generating organs and tissues for transplants?	84% (234)	81% (1019)
It is an acceptable practice to freeze and store gametes for parents who may wish to use them later for artificial insemination?	80% (221)	70% (878)
It is an acceptable practice to freeze and store gametes for parents who may wish to use them later for posthumous reproduction (that is, after the father has died)?	62% (171)	54% (681)
It will be a great achievement when genetic engineering of the human genome enables us to eliminate serious genetic defects?	90% (249)	90% (1132)

TABLE 7. Variables associated with attitudes of doctors and students towards new genetic technologies in 2002 survey

	<i>Status (doctor/ student)</i>	<i>Religion</i>	<i>Sex</i>	<i>Marital status</i>	<i>Number of children</i>	<i>Awareness of Human Genetics Unit</i>	<i>Genetics studied at medical school</i>
Cloning of human beings may be an ethically acceptable means of overcoming reproductive problems in the future?	p < .001 ^a	p = .041 ^b	p < .001 ^c			p = .009 ^d	
Cloning of body cells may in future be an ethically acceptable way of generating organs and tissues for transplants?							
It is an acceptable practice to freeze and store gametes for parents who may wish to use them later for artificial insemination?	p = .002 ^e		p < .001 ^f			p < .001 ^g	
It is an acceptable practice to freeze and store gametes for parents who may wish to use them later for posthumous reproduction (that is, after the father has died)?	p = .007 ^h	p = .016 ⁱ					p = .037 ^j
It will be a great achievement when genetic engineering of the human genome enables us to eliminate serious genetic defects?		p = .023 ^k					

Note: Positive responses associated with being: ^adoctors; ^bHindus or Moslems; ^cmen; ^dwithout knowledge of the Human Genetics Unit; ^edoctors; ^fmale; ^ghaving awareness of the Human Genetics Unit; ^hdoctors; ⁱHindu or Buddhist; ^jhaving awareness of the Human Genetics Unit; ^kMoslems or Protestants. All other associations non-significant (p < .050).

from both doctors and students with 90% of both groups seeing this as a positive future development.

Concerns about new genetic technologies appearing in respondents' written comments mostly settled on questions of whether the new technologies violated nature and went beyond ethically acceptable boundaries. Cloning in particular drew some strong written responses among students. Whilst one or two expressed support for the idea of cloning as a means to social engineering, the majority expressed deep abhorrence.

Discussion

As in the 1985 survey, there appears to be an overwhelmingly positive response to new developments in the fields of reproductive and genetic technology among both doctors and students. There is a strong sense of wanting to meet the repro-genetic revolution actively and in a positive way. However, the technologies we have invited doctors and students to consider are not simply about preserving or enhancing the quality of life but go beyond this in that they touch upon the processes whereby life itself comes into being. As such, they engage the moral and ethical sensibilities of medical practitioners in ways that other interventions do not. Both surveys reveal some of the ways that attitudes vary once we begin to move beyond general issues of acceptance and into consideration of particular techniques. Factors such as age, experience, gender and religion all appear to play a part in determining responses.

Important differences emerge in the way that doctors and students view what is and is not acceptable intervention. In both surveys students would seem to be more inclined to respond positively regarding the use of counseling and the use of amniocentesis for various kinds of testing. However, when it comes to the use of techniques that involve more elaborate transfers and manipulation of bio-genetic material as well as the more thorny questions regarding the issue of termination, students appeared to be more reticent than practicing doctors. Their written comments also reveal much higher levels of apprehension about the future turns that these technologies might take. We would suggest that these observations are in part related to age and experience. Indeed, the views expressed are also closely correlated with marital and parental status. Those who are married and with children seem more likely to be permissive in their attitude towards more elaborate interventions in human reproduction whereas those who are single and without children are more likely to be cautious. It may be that those who have encountered professionally the consequences of infertility and genetic disease have greater confidence and stronger convictions when it comes to the advocacy of ethically challenging interventions (also c.f. Jayasekara, 1989, p. 268).

The surveys also reveal some important differences in relation to how men and women respond to the range of techniques considered. In a pattern somewhat similar to the one seen in relation to students and doctors, it would appear that women are more positively disposed when it comes to questions of counseling and testing. However, men are more likely to accept a wider range of reproductive

interventions. It may be that women are more likely to respond empathetically to the position of other women faced with the challenges of reproduction (c.f. Jayasekara, 1986, p. 72). Men, on the other hand, may be less concerned with the physical and emotional tribulations of reproduction and pay more attention to acceptable long-term outcomes for the family and how to achieve them.

Finally, declared religion appeared to be an important factor in determining responses. A commonly occurring sequence in the 2002 survey identified Hindus, closely followed by Buddhists as the most accepting of the new reproductive and genetic technologies. The Protestants in the sample appeared to be the most troubled by these developments with Moslems and Catholics only slightly less so. Given that this sequence, with slight variation, recurs in relation to a number of the questions asked and the fact that Hindus and Buddhists tend to be rather similar in their responses, the question of religious differences becomes an important point for further enquiry. Of relevance here is the fact that neither Hinduism nor Buddhism are mono-theistic religions and both have a belief in either reincarnation or rebirth. Christianity and Islam, however, view life as divine creation and, in theological terms, are therefore far more likely to see interventions in reproduction that go beyond improving maternal and child health in pregnancy, as in some way usurping God's will. Therapeutic termination, extra-corporeal fertilization and techniques made possible by the new genetics are likely to set practicing Moslems and Christians at odds with current developments in genetic and reproductive medicine in ways that Hindus and Buddhists are not. This is not to say that these technologies do not pose ethical problems for Buddhists and Hindus but rather that these beliefs, at least at the doctrinal level, allow greater latitude when it comes to the moral evaluation of scientific development (Harvey, 2000; Keown, 1995).⁵ Buddhists in particular have a long tradition of identifying themselves with scientific and philosophical perspectives as distinct from religious traditions that rely upon the authority of divine revelation (Wijesekera, 1977; Kirthisinghe, 1999).

Conclusions

Management of complex new technologies and the ethical turbulence they bring in their wake is no longer just an issue for the western world but is now a challenge of global proportions. Like many developing countries, Sri Lanka is at a very early stage in the process of addressing these issues. Bringing practice in these areas within a formal framework of guidance and regulation involves not just asking what is economically feasible but also what is culturally appropriate and ethically acceptable in the local context. The institutional frameworks needed to address these questions are only beginning to emerge. Nevertheless, at an individual level, medical professionals are clearly engaged with the business of understanding the nature of these developments and their impacts. In this paper we have attempted an overview and systematic analysis of the views of doctors and medical students in relation to a range of technologies that are brought to bear on problems of infertility and genetic disease. As such, it has enabled us to

bring into focus some of the distinctive issues and themes that characterise their responses to this challenge.

As in the earlier survey one of the most significant ethical ‘hot spots’ is that of termination and future policy when it comes to identifying problems early in pregnancy. It is clear that in both surveys there is an overwhelming level of support for the option of terminating where congenital defects are in evidence and, likewise, overwhelming support for a change in the law to make such decisions lawful. The majority of doctors and students appear to be at odds with the minority of their colleagues who oppose these changes on moral grounds. However, they are even more at odds with the wider legal framework which currently constrains their actions, and occasionally does so in circumstances where they may well feel that a termination is in the long term interests of the family (for example, where a mother is required to carry a child to term with a gross malformation, such as anencephaly). As we have seen from the survey, the absence of termination as a legitimate option where defects are identified pre-natally has played a significant part in preventing the take-up of pre-natal testing in Sri Lanka and in turn limited the scope for genetic counseling. We would further suggest that, as the next generation of genetic testing and screening becomes more easily available (e.g. in relation to Thalassaemia or the Dystrophies), there will be a similarly partial and problematic engagement with testing and counseling. Needless to say what some would see as a failure to engage with progress in human rights, public health and patient care, others would see as a principled stand against a morally offensive drift towards eugenics.

In relation to the new reproductive technologies, the moral qualms that beset testing and termination are not apparent. The ‘miraculous’ work of doctors and researchers means that opportunities for parenthood are present where before there were none. Put simply, new reproductive technologies are, on the face of it, pro-natal and life creating rather than life-destroying (Simpson, 2004b). However, moving beyond the surface level reveals concerns, particularly, among younger respondents, about the social and legal confusion that unbridled transactions in human biogenetic materials could release. Overwhelming initial support for the simple objective of alleviating infertility is considerably tempered once respondents move beyond arrangements which mirror and support traditional family patterns. Helping a married couple conceive through AIH is one thing, using donor sperm and a surrogate mother is quite another. Such concerns suggest that in Sri Lanka, as in other developing countries, the move from chance to choice in human reproduction does not simply follow the ethical tramlines laid down by westerners but incorporates features of local culture, religion and politics in ways that give distinctive shape to an emergent ethics of the new reproductive and genetic technologies.

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Notes

1. India in particular has an extensive and long established programmes for assisted reproduction (Widge, 2002; Bharadwaj, 2000, 2002). Also see Rojanasakul *et al.* (1994) for details of developments in Thailand, and Olatunbosun *et al.* (1990) for Nigeria.
2. The limited work that has been carried out in this regard would suggest that the views of professionals and lay people vary considerably from country to country. The work of Macer *et al.* (1996) revealed widely differing views on the acceptability of genetic engineering between the populations of Japan and New Zealand with the latter being rather more sceptical about its potential to impact positively on the quality of life (also see Macer, 1994). Wertz and colleagues have carried out extensive cross-country comparisons of attitudes towards genetic testing and genetic counseling (Wertz & Fletcher, 1998; also see Wertz & Fletcher, 1989).
3. The Human Genetics Unit of the Colombo Medical Faculty was started in 1983 with funding from the World Health Organisation. It is the only unit of its kind in Sri Lanka and currently supplies training courses in clinical genetics to a wide range of postgraduate doctors and undergraduate medical students. The Unit has had a long running Genetics Awareness Programme (GAP) aimed at the wider community using leaflets and public lectures to raise public understanding about issues such as consanguinity, pre-conception counselling and the management of various genetic conditions. The Unit also operates a monthly clinic where cases of suspected chromosomal abnormality are referred for basic karyotyping.
4. The most recent of these is Genetech Molecular Diagnostics and School of Gene technology which aims to provide a range of genetic diagnostic and screening services on a commercial basis (see <<http://www.genetechlanka.com>>).
5. In an earlier paper (Dissanayake *et al.*, 2002) we discuss the way in which Buddhist notions of rebirth impinge upon the conduct of IVF treatment. Life does not come about with the union of sperm and egg as there must necessarily be a third condition, namely the arrival of consciousness (*vinnana*) which is the energy passed on following the death of another being at another time and place in the universe. Without *vinnana* there is only inanimate matter, a belief that has important implications for Buddhism evaluation of techniques such as IVF, PGD and cloning.

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