

Should access to fertility-related services be conditional on body mass index?

Anjel Vahratian¹ and Yolanda R. Smith

Department of Obstetrics and Gynecology, University of Michigan Medical School, L4000 Women's Hospital, 1500 E. Medical Center Dr., Ann Arbor, MI 48109-5276, USA

¹Correspondence address. Tel: +1-734-930-5612; Fax: +1-734-930-5609; E-mail: amv@med.umich.edu

Guidelines for the clinical management of obese, reproductive age women with reduced fertility in the USA are limited. Clinical professional organizations have yet to publish practice guidelines on this topic. Thus, treatment decisions are made at the provider and/or clinic level and the variation in clinic policy regarding fertility treatment for obese women is not readily available. Globally, there is an ongoing discussion among reproductive endocrinologists that practice in countries with government-funded health care about whether treatment should be restricted to women under a certain body mass index. Our analysis of a representative US population identified that differences exist in the utilization of fertility-related services according to female body mass. Women with class II/III obesity were the group reporting the highest percentage seeking medical attention to become pregnant, but the lowest percentage receiving medical or surgical fertility-related services, although these differences were not statistically significant. As the prevalence of obesity among women of reproductive age increases both in the USA and abroad, it is critical to consider the medical, social and ethical issues involved in allocating resources for fertility treatment. Ongoing monitoring of trends in service utilization in light of the obesity epidemic and delayed childbearing will provide further insight into this clinical health policy issue.

Key words: body mass / infertility / reproductive health services / obesity / morbid

Introduction

The increasing prevalence of overweight and obesity is a critical public health problem for women of childbearing age (Ogden *et al.*, 2006). In the USA, 51.7% of non-pregnant women aged 20–39 years are overweight or obese [body mass index (BMI) ≥ 25 kg/m²], 28.9% are obese (BMI ≥ 30 kg/m²) and 8.0% are extremely obese (BMI ≥ 40 kg/m²) (Ogden *et al.*, 2006). Globally, the World Health Organization estimates that ~1.6 billion adults are overweight and at least 400 million adults are obese (World Health Organization, 2006).

Obesity has been associated with both short- and long-term health effects for women as well as for their offspring (Catalano, 2007). In particular, existing research supports a link between female obesity and conditions that impair a woman's ability to conceive and that increase her risk for an adverse pregnancy outcome (Zaadstra *et al.*, 1993; Grodstein *et al.*, 1994; Rich-Edwards *et al.*, 1994; Bolumar *et al.*, 2000; Catalano, 2007).

Guidelines for the clinical management of obese, reproductive age women with reduced fertility in the USA are limited. Clinical professional organizations such as the American Society for Reproductive Medicine and the American College of Obstetricians and

Gynecologists have yet to publish practice guidelines on this topic. Thus, treatment decisions are made at the provider and/or clinic level and the variation in clinic policy regarding fertility treatment for obese women is not readily available.

Globally, there is an ongoing discussion among reproductive endocrinologists that practice in countries with government funded health care about whether treatment should be restricted to women under a certain BMI (Balen *et al.*, 2006; Farquhar and Gillett, 2006; Gillett *et al.*, 2006; Laredo, 2006). Those in support of restricting treatment cite issues such as limited funding of services, reduced likelihood of success with conception and the increased risk for pregnancy complications with obesity (Balen *et al.*, 2006; Farquhar and Gillett, 2006; Gillett *et al.*, 2006; Nelson and Fleming, 2007). In such instances, international reproductive endocrinologists are advising their patients to lose weight prior to initiating care or as a first course of treatment, based on research demonstrating that modest weight loss improves reproductive outcome for many obese women (Clark *et al.*, 1995, 1998; Glazer *et al.*, 2004). However, opponents of this approach believe that this form of clinical decision-making unfairly stigmatizes these women and limits their timely access to diagnostic tests and effective treatments (Laredo, 2006; Nelson and

Fleming, 2007). Alternatively, they propose that obese women should be encouraged to try to lose weight prior to conception and not specifically prior to receiving infertility treatment (Moran and Norman, 2002; Norman *et al.*, 2004; Nelson and Fleming, 2007).

Female obesity and utilization of fertility-related services in the USA

There is a paucity of information about the utilization of fertility-related services in the USA and in particular, stratified by female body mass. In particular, it is unclear if a disparity in service access and utilization currently exists in the USA. Thus, we conducted a secondary analysis of data from the 2002 National Survey of Family Growth (NSFG), a periodic population-based survey, to explore these issues further. A detailed description of the NSFG sample design and sampling weights is provided elsewhere (National Center for Health Statistics, 2004, 2005; Lepkowski *et al.*, 2006).

As this analysis involved a public-use data set stripped of identifiers, the University of Michigan Institutional Review Board classified this research as 'non-regulated'; thus, formal approval was not required. The sample was restricted to non-pregnant female respondents 20–44 years of age with a recorded BMI ≥ 18.5 kg/m² ($n = 5823$). BMI was recorded as a categorical variable based on the World Health Organization's obesity classification for adults (World Health Organization, 1995) and consisted of the following levels: normal weight (18.5–24.9 kg/m²; $n = 2896$); overweight (25.0–29.9 kg/m²; $n = 1522$); class I obesity (30.0–34.9 kg/m²; $n = 795$) and class II or III obesity (≥ 35 kg/m²; $n = 610$).

In the majority of our analyses, we further restricted our sample to women who indicated that they (or their partner) had been to a doctor or other medical care provider to talk about ways to help them become pregnant ($n = 497$). Respondents were asked about the types of services ever received to help them become pregnant (advice, infertility testing, drugs to improve ovulation, surgery to correct blocked tubes, artificial insemination, or other medical help—which could include services such as surgery or drug treatment for endometriosis, *in vitro* fertilization (IVF), surgery or drug treatment for uterine fibroids, or other pelvic surgery). For those who indicated that they received infertility testing, respondents were also asked who in the relationship had the testing.

Univariate and multivariate analyses were conducted to ascertain demographic characteristics of the study population and to document variations in the utilization of various fertility-related services according to non-pregnant BMI. The SURVEYFREQ procedure in SAS was used to perform the above-mentioned analyses. The Rao–Scott modified χ^2 test was applied to test for statistical significance at the $P < 0.05$ level. For all analyses, the data were weighted to adjust for the survey design, sampling, coverage and response rates so that accurate national estimates can be made from the sample. Thus, the data presented can be generalized to all US non-pregnant, non-institutionalized women 20–44 years of age with a BMI ≥ 18.5 kg/m² who may have sought fertility-related care.

Nearly 10% of women in this study population reported that they (or their partner) had been to a doctor or other medical care provider to talk about ways to help them become pregnant. Stratification by

BMI showed that more women with class I (10.8%) or class II/III (12.5%) obesity reported that they (or their partner) ever received fertility-related services than those who were normal weight (9.4%) or overweight (8.7%). The relationship between BMI and the receipt of medical help to become pregnant was not statistically significant ($P = 0.33$) but demonstrated an increasing trend (OR 1.10; 95% CI: 0.97, 1.24).

Demographic characteristics of the primary study population, women who indicated that they (or their partner) received fertility-related care, are presented in Table I. There were no significant differences in age, race and Hispanic origin, educational attainment, or insurance status across BMI categories. Of note, obese women had the lowest percentage of private insurance and the highest percentage of uninsured status among the cohort. The association between BMI and household income was statistically significant ($P < 0.001$), as 30.7% of women with class II/III obesity reported an annual household income of more than \$49 000, compared with 64.4%, 66.4% and 65.2% of normal, overweight and class I obese women. Previous research on obese women has shown a similar inverse relationship between obesity and socioeconomic factors such as private insurance status and income level (Yeh and Shelton, 2005; Chu *et al.*, in press).

The majority of women, regardless of their body mass, sought fertility assistance within 2 years of trying to conceive (Table II). Advice, infertility testing and drugs to improve ovulation were the most common forms of medical help received for women (or their partners) across BMI categories. When infertility testing was performed, 30.4% of women with class I obesity and 32.6% of women with class II/III obesity reported that they underwent testing alone, compared with 17.8% of overweight and 27.0% of normal weight women. This association did not achieve statistical significance ($P = 0.36$). In contrast, the percentage of women who reported receiving drugs to improve ovulation varied by female body mass, with 51.7% of class I obese women receiving this treatment, compared with 42.4% of class II/III obese, 31.7% of overweight and 49.4% of normal weight women. This association achieved statistical significance in bivariate analyses ($P = 0.02$).

Female respondents were asked to categorize the types of fertility-related diagnoses they received from their provider. A problem with ovulation was the most frequently reported diagnosis across all body mass categories, with nearly one in two women with class I obesity citing this diagnosis. Overall, the association between BMI and a diagnosis of a problem with ovulation was statistically significant ($P = 0.04$). Similarly, a statistically significant difference was noted between BMI and a diagnosis of blocked tubes ($P = 0.01$). Normal weight women were 1.5 times more likely than overweight and 2 times more likely than women with class I obesity to receive this diagnosis. One suggestion for this relationship is that obese women are more likely to experience problems with ovulation. If ovulatory dysfunction is their primary problem, the percentage of women with tubal infertility in this subgroup is likely to be lower. In addition, previous work has suggested that women with ovulatory problems may present with different risk factors for exposure to sexually transmitted disease when compared with women with tubal blockage (Beral *et al.*, 1994).

Further study of the respondents who received advice or infertility testing showed that only 42.7% of women with class II/III obesity

Table 1 Demographic characteristics* of the study population, stratified by BMI, 2002 National Survey of Family Growth

	BMI 18.5–24.9 kg/m ² (n = 236)	BMI 25.0–29.9 kg/m ² (n = 125)	BMI 30.0–34.9 kg/m ² (n = 71)	BMI ≥ 35.0 kg/m ² (n = 65)	P-value
Age					0.89
20–29 years	13.2	13.5	10.3	16.1	
30–39 years	49.6	51.2	50.4	57.5	
40–44 years	37.2	35.3	39.3	26.4	
Race and Hispanic origin					0.23
Non-Hispanic White	83.6	72.8	77.0	81.5	
Non-Hispanic non-White	9.8	15.8	11.9	8.8 [†]	
Hispanic	6.6	11.4	11.1	9.7	
Educational attainment					0.73
<High school	5.6	7.6	10.4 [†]	7.8 [†]	
High school	17.8	14.3	23.1	18.5	
>High school	76.6	78.0	66.5	73.7	
Insurance status					0.36
Private	90.4	88.1	78.2	76.3	
Medicaid/SCHIP/State	1.4 [†]	4.1 [†]	6.9 [†]	5.2 [†]	
Other	1.6 [†]	1.4 [†]	1.0 [†]	2.2 [†]	
Uninsured	6.6	6.4	13.9	16.2	
Total annual household income					<0.001
<\$20 000	5.8	10.6	14.1	38.1	
\$20 000–\$34 999	14.0	13.6	9.7	15.5	
\$35 000–\$49 000	15.8	9.4	11.0	15.7	
>\$49 000	64.4	66.4	65.2	30.7	

*Percentages are weighted to reflect national estimates.

[†]Note the unweighted frequency was <10.

reported receiving medical or surgical fertility treatment, compared with 64.0% of class I obese, 47.4% of overweight and 58.9% of normal weight women. Although this relationship did not achieve statistical significance ($P = 0.09$), a declining trend was noted (OR 0.86; 95% CI: 0.71, 1.06). These findings may suggest that disparities in infertility counseling and treatment may exist according to body weight-for-height. For example, providers may recommend weight loss as the first course of treatment or as a prerequisite to treatment. However, an alternate possibility is that obese women may experience financial limitations that prevent them from obtaining medical and/or surgical treatment. For instance, our data showed that obese women had the lowest percentage of private insurance and the highest uninsured status than any other group. Further research is warranted to better understand the effect of provider practices patterns on receipt of infertility services for obese patients.

Gaps in evidence-based research

Previous studies have documented an independent association between obesity and fecundity among women undergoing infertility treatment (Zaadstra *et al.*, 1993; Grodstein *et al.*, 1994; Wang *et al.*, 2000; Whittemer *et al.*, 2000; Nichols *et al.*, 2003; Metwally *et al.*, 2007). For example, Grodstein *et al.* (1994) showed that, among a sample of 597 women diagnosed with ovulatory infertility

at seven infertility clinics, obese women (BMI ≥ 27 kg/m²) have 3.1 times the risk of ovulatory infertility (95% CI: 2.2, 4.4) when compared with normal weight women (BMI 20.0–24.9 kg/m²) (Grodstein *et al.*, 1994). Moreover Metwally *et al.*, in a review of the literature on the impact of obesity on female reproduction, state that it is common for obese women to not only require a higher dose of ovarian stimulation drugs during IVF, but also to have fewer oocytes collected at the time of retrieval (Metwally *et al.*, 2007).

However, there is limited information about how a woman's body mass may alter the types of fertility-related services she and her partner receive. Although cross-sectional in nature, our analysis provides additional insight into these issues and supports the need for ongoing monitoring and assessment of the clinical management of obese women with fertility problems. Moreover, a dearth of information on the clinical policies of fertility clinics related to obesity hinders one's ability to draw inferences from existing evidence-based research.

International comparisons

Trends in the provision of fertility services are important to document and monitor, as other industrialized countries with government-funded healthcare consider restricting access to fertility-related services based on a female patient's BMI status (Balen *et al.*, 2006;

Table II Fertility-related characteristics of the study population stratified by body mass index*, 2002 National Survey of Family Growth

	BMI 18.5–24.9 kg/m ² (n = 236)	BMI 25.0–29.9 kg/m ² (n = 125)	BMI 30.0–34.9 kg/m ² (n = 71)	BMI ≥ 35.0 kg/m ² (n = 65)	P-value
Medical help received [†]					
Advice	78.4	73.1	61.7	71.9	0.26
Infertility testing	61.2	48.5	59.7	59.1	0.34
Drugs to improve ovulation	49.4	31.7	57.1	42.4	0.02
Surgery to correct blocked tubes	12.0	5.7	5.1	4.9	0.06
Artificial insemination	12.6	16.0	11.9	11.6	0.87
Other medical help	17.2	17.6	14.1	8.6	0.40
Received medical or surgical treatment					0.09
Yes	58.9	47.4	64.0	42.7	
No	41.1	52.6	36.0	57.3	
Duration of infertility prior to seeking medical help [‡]					0.99
< 12 months	33.2	24.8	34.5	31.7	
12–23 months	37.8	38.2	34.1	37.2	
24–35 months	14.2	16.5	14.5	13.7	
> 35 months	14.8	20.5	16.9	17.4	
Partner who had infertility testing [§]					0.36
Female	27.0	17.8	30.4	32.6	
Male	11.4	3.7	8.6	5.5	
Both	61.6	78.5	61.0	61.9	
Infertility problems identified by provider [†]					
Problems with ovulation	30.8	25.7	49.4	38.2	0.04
Blocked tubes	14.8	9.7	7.8	2.2	0.01
Other tube or pelvic problems	16.5	14.7	7.1	14.1	0.30
Endometriosis	19.4	11.2	9.2	14.1	0.06
Semen or sperm problems	18.0	22.6	15.7	11.5	0.28
Any other infertility problems	8.9	7.0	1.4	11.3	0.25

*Data are presented as weighted percentages.

[†]Respondents could select more than one response.

[‡]Information was not available from all respondents.

[§]Question was applicable to respondents who indicated that they received infertility testing.

^{||}Note the unweighted frequency was <10.

Gillett *et al.*, 2006). For instance, in New Zealand, all elective, publicly funded medical procedures are ranked according to clinical priority access criteria. In 2000, criteria for the public's access to assisted reproductive technologies were established in New Zealand to 'provide a rationing basis for public access to treatment for couples who were most in need but balanced by those who would benefit most from treatment' (Gillett *et al.*, 2006, p. 1218). Factors that influence a woman's ability to become pregnant, such as her age, smoking status, duration of infertility, probability of spontaneous pregnancy given her infertility diagnosis and other chronic co-morbidities, are included in a prognostic score that ultimately determines a New Zealand woman's access to treatment. As obesity can reduce a woman's likelihood of becoming pregnant, even with infertility treatment, only women with a BMI of 18–32 kg/m² are eligible for

treatment (Gillett and Peek, 1997; Hadorn and Holmes, 1997; The New Zealand Ministry of Health 2001; Gillett *et al.*, 2006). Women with a BMI outside this range but with a qualifying priority score are placed on 'active review' and encouraged to lose weight (Gillett *et al.*, 2006).

The UK has yet to issue formal policies regarding the fertility management of obese women. However, in 2004, they published National Institute for Clinical Excellence (NICE) guidelines on fertility, which included a clinical practice algorithm on the assessment and treatment for people with fertility problems (National Institute for Clinical Excellence, 2004). In this document, providers are encouraged to provide these patients with 'lifestyle advice' that includes smoking cessation, reductions in alcohol consumption, occupational hazards, frequency of sexual intercourse and achieving a BMI of 19–29 kg/m².

In June 2008, the UK Department of Health published results from a national survey of the provision of IVF services in England in the past year (The United Kingdom Department of Health, 2008). As part of the survey, clinics were asked about whether they had any non-clinical access criteria for eligibility for services. In general, the non-clinical access criteria focused on issues such as marital status and/or stability of relationship, age of patient and/or partner, parity, tobacco use and previous sterilization. However, one site (South Staffordshire) reported that they include a BMI of 20–25 as a non-clinical access criterion for IVF.

In a postal survey to 86 Human Fertilization and Embryology Authority (HFEA) licensed fertility units in the UK, Zachariah *et al.* (2006) showed that variation exists in the practice standards of obese women among licensed assisted conception units in the UK. Two-thirds of the clinics surveyed reported that they actively applied specific weight criteria for offering various fertility treatments. For example, 74% of units applied an upper BMI limit for ovulation induction with gonadotrophins, 65% applied criteria for IVF procedures and 52% applied criteria for artificial insemination. Although the BMI thresholds reported varied from 25 to 40 kg/m², the majority of centers reported a BMI limit not exceeding 35 kg/m² for most treatments. Reasons cited for the use of BMI limits focused more on operative and anesthetic risks rather than success rates. Nearly all of the centers reported providing advice on lifestyle changes for weight loss, with 37% applying a time limit for the weight loss.

Lifestyle modification and preconceptional care

Recently, the March 2008 issue of *American College of Obstetricians and Gynecologists (ACOG) Today* highlighted the clinical debate on counseling obese patients regarding their fertility (The American College of Obstetricians and Gynecologists, 2008). This article touched on the importance of calculating a patient's BMI so that both provider and patient are aware of body mass status. Moreover, it briefly discussed the emerging ethical dilemma highlighted earlier and raised the issue regarding consideration of age in the decision process. Rather than proposing treatment recommendations, this article encouraged providers to open a discussion about effective management and treatment practices and to further evidence-based research.

Research has shown that women are willing to adopt healthier behaviors when pregnant, in an effort to improve pregnancy outcomes (Louis *et al.*, 2008). Proponents of preconceptional care suggest that this health-promoting behavior could be extended into the preconceptional and interconceptional period as an opportunity to improve one's personal health as well as that of a future child (Centers for Disease Control and Prevention, 2006). Encouraging obese women to adopt a lifestyle modification program to reduce their weight and improve their metabolic profile is an admirable approach to primary health care. However, it is unclear whether restricting access to care to fertility-related services, such as testing and monitoring, as part of this process is the best approach. Coordinated and consistent care across the lifespan is essential for women with chronic disease. To best serve this population, it is important that doors remain open (versus guarded) and that continued education and health promotion is provided to this population to ensure both short- and long-term success in pregnancy outcomes.

Ethical considerations

Those in support of restricting treatment cite issues such as limited funding of services, reduced likelihood of success with conception and the increased risk for pregnancy complications with obesity (Balen *et al.*, 2006; Farquhar and Gillett, 2006; Gillett *et al.*, 2006; Nelson and Fleming, 2007). However, evidence-based research on these issues is limited. Thus, it is unclear whether a restriction of services based on BMI is ethical. The European Society of Human Reproduction and Embryology (ESHRE) Task Force on Ethics and Law recently issued a statement on the equity of access to assisted reproductive technology (ESHRE Task Force on Ethics and Law including Pennings *et al.*, 2008). Although BMI thresholds were not specifically discussed in this document, the Task Force focuses the debate on whether 'the desire for a child should be considered a fundamental need or as a personal wish . . . and that infertility may be a serious handicap that prevents people from realizing an important life goal' (ESHRE Task Force on Ethics and Law including Pennings *et al.*, 2008, p. 772). The ESHRE Task Force contends that 'infertility treatment allows people to express their autonomy by realizing their reproductive choices and substantially increases their well-being' (ESHRE Task Force on Ethics and Law including Pennings *et al.*, 2008, p.772).

In a recent paper on assisted reproductive technologies and equity of access, Peterson (2005) contends that the restriction of fertility-related services to certain groups of women (e.g. single heterosexual women, lesbians, poor women, older women and disabled women) may violate a woman's right to autonomy (Peterson, 2005). Although he did not specifically comment on BMI thresholds, Peterson suggests that reasons posed for such restrictions, such as the scarcity of resources or financial limitations present an ethically contentious problem. In particular, considerations of medical and social utility in restricting access to fertility-related services by BMI often do not address issues such as consistency and fairness. Peterson states that the scarcity argument is frequently applied to a variety of services in medicine, yet there is often inconsistency in the methods of assessment of potential recipients of the scarce resource.

Next steps

As the prevalence of obesity among women of reproductive age increases both in the USA and abroad, it is critical to consider the medical, social and ethical issues involved in allocating resources for fertility treatment. Ongoing monitoring of trends in service utilization in light of the obesity epidemic and delayed childbearing will provide further insight into this clinical health policy issue. Our analysis identified trends toward differences in the utilization of fertility-related services according to female body mass, with class II/III obese women reporting the highest percentage of those seeking medical attention to become pregnant but the lowest percentage of those receiving fertility-related services that involved medical or surgical treatment. Additional evidence-based research is needed to understand the reasons for any discrepancy and the possible implications of withholding fertility treatment.

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