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REPORT

Development of a health promotion programme to improve awareness of factors that affect fertility, and evaluation of its reach in the first 5 years

Karin Hammarberg^{a,b,*}, Robert J. Norman^c, Sarah Robertson^c,
Robert McLachlan^d, Janet Michelmore^e, Louise Johnson^a

^a Victorian Assisted Reproductive Treatment Authority, Level 30, 570 Bourke Street, Melbourne 3000, Australia; ^b Jean Hailes Research Unit, School of Public Health and Preventive Medicine, Monash University, Melbourne, Australia; ^c Robinson Research Institute, School of Paediatrics and Reproductive Health, University of Adelaide, North Adelaide, Australia; ^d Andrology Australia, Monash University, Melbourne, Australia; ^e Jean Hailes for Women's Health, South Melbourne, Australia

* Corresponding author. E-mail address: Karin.hammarberg@monash.edu (K. Hammarberg).

Abstract Awareness among people of reproductive age about the factors that influence fertility and reproductive outcomes, including medically assisted reproduction outcomes, is generally low. To improve awareness about the potentially modifiable factors that affect fertility and reproductive outcomes, 'Your Fertility', a fertility health promotion programme funded by the Australian Government, was established in 2011. This paper describes the development and evaluation of the reach of the Your Fertility programme from its inception in 2011 to June 2016. Systematically recorded outcomes for the programme's key focus areas and Google Analytics data were collated. Key achievements include developing and maintaining an internationally renowned website that experiences high growth and demand for fertility-related information; by 2016, over 5 million users had viewed more than 10 million webpages, and over 96,000 users had engaged in programme messages across social media. Programme messages have reached more than 4 million Australian social media users, and a potential audience of 150 million through media coverage across more than 320 media features. More than 4200 education and health professionals have completed online learning modules, and external partnerships have been established with 14 separate organizations. Data collected over 5 years indicate that the Your Fertility programme meets a need for targeted, evidence-based, accessible fertility-related information. 

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Introduction

Several potentially modifiable factors influence reproductive function and outcomes. In particular, increasing parental age, smoking and obesity adversely affect the chance of conceiving spontaneously or via medically assisted reproduction (MAR) (Anderson et al., 2010; Augood et al., 1998; Campbell et al., 2015; Homan et al., 2007; Maheshwari et al., 2007; Utting and Bewley, 2011; Wiener-Megnazi et al., 2012a). These factors

also increase the risk of obstetric and neonatal complications (Marchi et al., 2015; Sartorius and Nieschlag, 2010; Schmidt et al., 2012; Wiener-Megnazi et al., 2012b; Wilding, 2015; Zenzes, 2000). Furthermore, evidence is emerging that obesity, smoking and other environmental factors can cause epigenetic changes in spermatozoa and oocytes which influence the developmental trajectory of the embryo and fetus, ultimately affecting the lifetime health of the child (Lane et al., 2014). Knowledge of, and the ability to recognize,

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the physical changes that occur before ovulation so that intercourse can be timed to coincide with the most fertile days in the menstrual cycle can improve the chance of conception and reduces the time to pregnancy (Ecochard et al., 2015; Stanford et al., 2002).

Awareness among people of reproductive age about the factors that influence fertility and reproductive outcomes, including MAR outcomes, is generally low. Studies among students in Canada, Israel, Sweden, Denmark, the USA, the UK and China indicate that most want, and expect to have, children but underestimate the impact of age on their chance of achieving their aspirations of parenthood (Bunting and Boivin, 2008; Chan et al., 2015; Hashiloni-Dolev et al., 2011; Peterson et al., 2012; Quach and Librach, 2008; Skoog Svanberg et al., 2006; Sylvest et al., 2014). Similarly, studies of men and women from the general population show that most have limited knowledge of the factors that influence fertility, and overestimate the ability of MAR to overcome age-related infertility (Bunting et al., 2013; Daniluk and Koert, 2013; Daniluk et al., 2012; Hammarberg et al., 2013; Lundsberg et al., 2014; Maeda et al., 2015; Maheshwari et al., 2008; Mortensen et al., 2012; Sørensen et al., 2016; Tough et al., 2006; Vassard et al., 2016). This indicates a need for more public education about the effects of age and health behaviours on reproductive outcomes to prevent infertility and allow people to fulfil their parenthood goals (Lemoine and Ravitsky, 2015; Lucke, 2015; Mazza et al., 2012). Evidence about the efficacy of fertility-related education interventions is emerging, with some studies reporting positive effects on knowledge (García et al., 2016; Stern et al., 2013; Wojcieszek and Thompson, 2013) and others reporting no change in knowledge (Daniluk and Koert, 2015).

Health professionals are expected to promote fertility awareness, reproductive life planning and preconception health optimization (Practice Committee of the American Society for Reproductive Medicine in collaboration with the Society for Reproductive Endocrinology and Infertility, 2008; RACGP, 2012). It has also been suggested that sexual and reproductive health education should incorporate information about the limitations of the reproductive lifespan and how fertility can be protected (Kisby Littleton, 2012; Lucke, 2015; Pitts and Hanley, 2004). However, health and education professionals need time, up-to-date knowledge and educational resources to be effective in their role as fertility and reproductive health promoters (Hammarberg et al., 2016; Mazza et al., 2013; Moran et al., 2016).

An environmental scan in 2010 revealed no existing comprehensive fertility-related health promotion programme. Therefore, to improve awareness about factors that affect fertility and reproductive outcomes, and allow people to make informed and timely decisions regarding childbearing, 'Your Fertility', a fertility health promotion programme funded by the Australian Government, was established in 2011. The primary target audience of this programme is individuals of reproductive age who want to have children now or in the future. Healthcare and education professionals are a secondary target audience. The programme is based on health education principles which, according to the World Health Organization, comprise 'consciously constructed opportunities for learning involving some form of communication designed to improve health literacy, including improving knowledge, and developing life skills which are conducive to individual and community

health' (WHO, 1998). The Your Fertility programme has five key focus areas: (i) to develop, maintain and monitor the programme website; (ii) to conduct research to guide programme content, activities and dissemination strategies; (iii) to conduct community education events; (iv) to develop educational opportunities for professionals; and (v) to create value partnerships and effective collaborations. This paper describes the development and evaluation of the reach of the Your Fertility programme from its inception in 2011 to June 2016.

Materials and methods

Setting

The Victorian Assisted Reproductive Treatment Authority (VARTA) in the state of Victoria, Australia is an independent not-for-profit statutory authority responsible for administering aspects of the Assisted Reproductive Treatment Act 2008 (Victorian Government, 2008). One of its roles is to provide public education and resources for the community and health professionals on matters relating to fertility and assisted reproductive technology. In 2011, the Your Fertility programme was initiated by VARTA after securing funding from the Australian Government. To deliver the programme, VARTA partnered with other not-for-profit organizations and formed the Fertility Coalition, comprising VARTA as lead agency, the Robinson Research Institute at the University of Adelaide, Andrology Australia and Jean Hailes for Women's Health.

Development and implementation of the Your Fertility programme

In the first 5 years of the Your Fertility programme, it had, on average, 1.2 full-time equivalent employees consisting of 0.7 project managers, 0.2 media and communications officers, and 0.3 scientific writers. Together with the VARTA leadership and members of the partner organizations in the Fertility Coalition, these individuals developed and delivered the programme. Development and implementation of the programme was further assisted by a reference group, consisting of eight members representing organizations with an interest in fertility health, and an advisory group, with nine representatives from different areas of expertise including public health, general practice, gynaecology, andrology, family planning, MAR, research, obesity, fitness and multiculturalism.

Evidence to inform programme content, activities and dissemination strategies is drawn from the published literature, and qualitative and quantitative research conducted as part of the Your Fertility programme's activities in 2011, 2013 and 2015. Based on the evidence that most people use the internet to source health information (Diaz et al., 2002), a website was created to serve as the main platform for dissemination of programme information and resources (www.yourfertility.org.au). The website is mobile-friendly, can be accessed on mobile telephones and other mobile devices, and the content is written in accessible language and based on up-to-date evidence. Initially, it focused on the most common potentially modifiable factors that affect fertility and reproductive outcomes, such as parental age, obesity, smoking, alcohol consumption, and when in the menstrual cycle a woman is most likely to conceive. Over time, the

content has been expanded to cover other factors that affect fertility and reproductive outcomes, including sexually transmitted infections, environmental toxins, nutrition and exercise. The website also features interactive tools including an ovulation calculator, a fertility quiz, a preconception health check list and a fertility potential gauge (launched in June 2016), illustrative animations, videos with experts discussing how fertility and reproductive health can be optimized, a news blog, and opportunities for social media interaction through Facebook, Twitter and Instagram.

Based on evidence that men aspire to parenthood as much as women (Fisher et al., 2010; Holton et al., 2016), a key aspect of the programme is that its content is directed equally to men and women, and that the website has sections dedicated for men. The website also has a section for health and education professionals which features a range of resources to help them promote fertility awareness and reproductive life planning. These include referenced fact sheets relating to factors that affect fertility; professional development webinars and learning modules on fertility, preconception care, and how fertility and preconception health can be optimized; a male fertility assessment tool; and videos with experts discussing how to approach fertility and preconception health promotion. In addition, there is a fertility and reproduction teaching module specifically for education professionals.

To draw media attention to the programme and drive traffic to the website, an annual Fertility Week event focuses on a specific aspect of the programme. To date, these have been: key modifiable factors affecting fertility (2012), men and fertility (2013), the 'fertile window' (2014), obesity and fertility (2015), and '7 ways in 7 days' (ways to improve reproductive health) (2016). Other campaigns that have been conducted are the 'Fertility is Ageist' (2014) and 'Quit for Fertility' (2016) campaigns which were promoted through social and traditional media, sponsored articles, advertisement on high-volume websites, and posters in fitness centres. Leading up to some of the campaigns, a public lecture or seminar featuring a key health professional or researcher was staged to promote campaign messages.

One of the programme's objectives is to develop effective partnerships to increase the reach of the programme and its messages. To achieve this, partnerships have been actively sought with organizations with overlapping interests, where

reciprocal sharing of information and promotion of messages have the potential to add value to the programme.

Method

Outcomes for the key focus areas have been monitored and recorded systematically since the initiation of the programme in 2011. Google Analytics are used to monitor website and associated social media use and engagement ([Google Analytics Solutions](#)).

Results

Website maintenance and monitoring

The Your Fertility website was developed in 2011, launched in March 2012, and is reviewed annually to ensure that its content reflects the most up-to-date evidence. [Table 1](#) shows the growth in usage of the Your Fertility website from March 2012 to June 2016. Substantial annual growth in the number of users resulted in more than 5 million people accessing the website in that period, 21% of whom were returning visitors. As the number of users outside Australia increased (mainly from the USA, the UK and India), the number of users in Australia as a proportion of all users decreased sharply in the first 3 years of the programme, but seems to have plateaued at around 11% in the last 2 years.

There were more than 10 million page views in the first 5 years of the programme. The three most frequently accessed webpages were: 'Women's guide to getting the timing right', which includes information about the 'fertile window' in the menstrual cycle and an interactive ovulation calculator (around 8.5 million views); the interactive fertility quiz (almost 400,000 views); and 'A woman's age affects her fertility' (almost 200,000 views). Videos and animations available on the website have been played almost 200,000 times, and almost 65,000 printable resources have been downloaded.

More than 80% of users came to the website through a key word entered into a search engine. This is likely because the website ranks first in an organic (as opposed to commercially funded) Google Australia search of the word 'fertility'. A proportion of users also engage with the social media

Table 1 Increase in use of the Your Fertility website from March 2012 to June 2016.

Measure	Year					
	2012	2013	2014	2015	2016 (January–June)	Total
Number of users ^a	17,138	123,167	702,870	2,628,616	1,615,485	5,087,276
Sessions ^b	21,655	125,404	858,903	3,359,735	2,016,004	6,381,701
Total page views ^c	81,758	368,649	1,544,002	5,655,041	3,130,497	10,780,947
Australian users ^d (% of total)	13,247 (61)	50,173 (34)	164,921 (19)	362,593 (11)	215,626 (11)	806,560
Number accessing content from a mobile device (% of total)	5888 (27)	74,528 (50)	578,883 (67)	2,533,402 (75)	1,600,694 (79)	4,761,930

^a A person who has accessed the website at least once.

^b A group of interactions that a user has with a website within a period of time. For example, a single session can include multiple views of individual pages, downloads, streaming, etc.

^c Total number of pages viewed within the website, including repeated views of a single page.

^d People located in Australia using the website.

platforms available on the website. The combined number of followers for Facebook, Twitter and Instagram currently stands at approximately 4500. Together, messages disseminated through these platforms are estimated to have reached 4.2 million people and engaged almost 100,000 users.

Research outputs

Three research projects were completed: a population-based survey assessing knowledge about potentially modifiable factors that affect fertility among the general population of people of reproductive age who want a child now or in the future (Hammarberg et al., 2013); a qualitative study of fertility-related knowledge and information-seeking behaviour among people of reproductive age (Hammarberg et al., 2017a); and an online survey of primary healthcare nurses assessing their knowledge, attitudes and practices relating to fertility-health promotion (Hammarberg et al., 2016). The findings of these studies have guided the programme's content, resource development and dissemination approach. Members of the Your Fertility team have also presented programme-related work at 14 conferences and given 15 lectures to professional and student groups.

Community education

Six targeted campaigns and 10 public lectures and seminars have been conducted, and these have attracted media attention. Based on circulation and size of audiences, the programme and its resources have reached a potential audience of 150 million people through media coverage across more than 320 media features.

Professional education opportunities

Three online learning and training modules for health professionals, including two webinars, have been developed and launched. These were accredited for professional development credit, and the two webinars have subsequently been made permanently available on the professional section of the website. Together, these resources have been accessed 4200 times to date. In addition, other resources for health and education professionals available on the website have been accessed almost 15,000 times.

To reach and engage health and education professionals and make them aware of the programme and its resources, members of the team have published 12 feature articles in professional magazines for general practitioners (Medical Observer, 2016), physicians (Australian Medical Association Victoria, 2016), primary healthcare nurses (Australian Primary Nurses Association, 2016), academics (The Conversation, 2016) and public health practitioners (Public Health Association of Australia, 2016).

Partnerships

The partners in the Fertility Coalition have contributed greatly to extending the reach of the programme through promotion of Your Fertility messages on their websites and in publications circulated to their memberships. It is

estimated that almost 150,000 health professionals and members of the public have been reached this way.

External partnerships have been established with 14 separate organizations. These include universities, professional societies, family planning organizations, government-funded health information agencies and health promotion organizations. The collaborative activities undertaken with these organizations are shown in Table 2.

Discussion

The knowledge gaps identified in formative community research and the extensive reach and use of the resources offered by the Your Fertility programme confirm that it meets a need for public and professional education about the impact of age and health behaviours on fertility and reproductive outcomes.

The main platform for communicating information and engaging with the target populations is the programme's website. The core attributes of the website content are that it: is written in accessible language and enhanced with images; is informed by the latest evidence and updated regularly; includes multimedia and interactive components; has dedicated sections for men, women, and health and education professionals; has social media interactivity; and has downloadable resources. By far the most commonly used web-based resources were those that relate to the 'fertile window' in the menstrual cycle, including how to identify pre-ovulatory cervical mucus. This points to a need for practical advice about ways to improve the chance of conception (Ecochard et al., 2015).

Most research relating to childbearing focuses on women; evidence about men's role in childbearing decisions is much more limited. In most studies about reproduction that include men, response rates among men are low (Hammarberg et al., 2017b); this can be explained, in part, by men's perception that reproduction is the women's domain (Slauson-Blevins and Johnson, 2016), although the method of data collection may also influence response rate (e.g. Sørensen et al., 2016). Yet, childbearing and parenting are shared endeavours and, contrary to the common stereotype that having children is more important for women than for men, most men want and expect to have two or more children (Holton et al., 2016). However, lack of knowledge about the limitations of fertility and the factors that affect fertility may increase the risk of men (and women) remaining childless or having fewer children than they had planned (Holton et al., 2016). To promote active involvement of prospective fathers in fertility decision-making and allow them to optimize their fertility potential, and because evidence suggests that men and women are twice as likely to make positive health behavioural changes if their partner does too (Jackson et al., 2015), the Your Fertility website has information and resources specifically directed to men.

The research component of the programme serves to inform the direction of the programme and generates evidence that contributes to knowledge about the need for, and value of, fertility health promotion. The dissemination of research findings in peer-reviewed journals, conference presentations and in the media likely contributed to the traffic to the Your Fertility website.

Table 2 Partner organizations of the Your Fertility (YF) programme and key activities.

Partner organization	Key activities
Australian Practice Nurses Association (APNA)	Regular promotion of YF project activities to the APNA network. YF contributed to the development of APNA's 'Managing Fertility in General Practice' workshop series, 2013. APNA member facilitated a YF-initiated survey among APNA members. APNA member featured as an expert in YF's 'Talking about your Fertility' video series, 2015
The Australian Research Centre in Sex, Health and Society (ARCSHS) Better Health Channel	YF provided content to 'Catching On', a teaching resource for middle and secondary school teachers teaching sexuality education in Australian schools, 2013 YF is a content partner with The Better Health Channel, a health information website funded by the Victorian Government. The Better Health Channel promotes YF and Fertility Week messages
Cancer Council Victoria LiveLighter (obesity prevention)	Fact sheet on weight, fertility and pregnancy health developed collaboratively and cross-promoted for Fertility Week 2015 Collaboration on social marketing campaign for World No Tobacco Day. Interactive smoking and fertility tool developed collaboratively, featuring on the Quit Victoria and YF websites
Quit Victoria (smoking cessation) Deakin University	Cross-promotion of campaign materials Public health and health promotion student interns have provided support for specific programme activities
Diabetes Victoria and Diabetes Australia	Fertility Week 2015 cross-promotion. A link to the YF website was provided on the Pregnancy and Diabetes website as an expert in fertility information
Family Planning Victoria	Development of the 'SafeLanding' teaching module, a resource for teachers highlighting the impact of age and lifestyle factors on fertility and preconception health
Fertility Society of Australia (FSA)	Development of a series of fact sheets on the impact of lifestyle factors on fertility for health professionals and 'translated' to a lay audience. Fact sheets are downloadable from the YF and FSA websites
HealthDirect	YF is content partner with HealthDirect, a health information website funded by the Australian Government. HealthDirect promoted Fertility Week 2015 and distributed an article about smoking and fertility for World No Tobacco Day to its network
University of Melbourne	A medical doctor undertaking Certification in Reproductive Endocrinology and Infertility provides expert advice as an intern with YF as part of her certification. A science communication student intern audited YF website content. A public health student intern contributed to a project implementation plan. A medical student intern is currently conducting a survey about fertility knowledge among university students
Monash University	Ongoing collaborations with researchers at the School of Public Health and Preventive Medicine
Public Health Association of Australia (PHAA)	YF team members contributed to the development of a PHAA statement on fertility. Needs analysis of barriers and enablers for general practitioners to provide preconception health checks. YF consulted in the development of the PHAA's Fertility and Preconception Health Policy
Royal Australian College of General Practitioners (RACGP)	RACGP member contributed to the 'Talking about your Fertility' video series which features on the YF website
Sexual Health and Family Planning ACT (SHFPACT)	YF materials incorporated into SHFPACT project 'Building Better Relationships', an Australian Framework for achieving better outcomes in family planning, reproductive and sexual health promotion, and sexuality and relationships education

Primary health and education professionals are in ideal positions to raise awareness about the effects of age and lifestyle factors on fertility and pregnancy outcomes. However, it is known that time constraints and lack of knowledge are barriers for health professionals to discuss fertility opportunistically with patients (Hammarberg et al., 2016; Mazza et al., 2013). To assist health and education professionals to promote reproductive life planning and knowledge about the limitations of fertility, the Your Fertility website includes downloadable

fact sheets and other resources, videos with experts discussing how fertility and preconception health messages can be integrated into primary care, and teaching materials.

The value of partnerships in enhancing the reach of health messages was evident in this evaluation. Actively engaging and working with partner organizations with overlapping interests and reciprocal sharing of information helps organizations reach people beyond their immediate network, and increases the reach of their messages.

The programme and its evaluation have some limitations. To date, the content focuses on heterosexual people with good health literacy. Development and inclusion of information and other resources suitable for people from marginalized and minority populations, including those from culturally and linguistically diverse groups, homosexual couples and single women, and people with low health literacy are planned in the next phase of the programme. The measure of reach of community education activities was based on circulation and size of audiences of the media outlets that featured Your Fertility programme messages. This is a very blunt measure that may not reflect accurately the number of people who were reached.

While the findings indicate that the programme's messages and resources resonate with the target audiences and are used extensively, there is no way of knowing if they lead to behavioural changes. To address this, we intend to add interactive tools to the website and capability to communicate with users and monitor their fertility health behaviour and reproductive outcomes in the next phase of the programme's development. The digital era offers new and exciting opportunities to engage people in health-promoting behaviours, including fertility health, through 'eHealth' and 'mHealth' (WHO, 2011). These will be explored in the next 3 years of the programme.

While programmes such as the one described in this report can reach a proportion of people, multistranded approaches are needed to improve public awareness about fertility and reproductive health. Some existing initiatives include web-based fora such as My Fertility Choices (www.myfertilitychoices.com), which offers information about available fertility testing, preservation, treatment and family building options; and FertiSTAT, a tool for testing fertility potential (Bunting and Boivin, 2010). More recently, a dedicated fertility assessment and counselling clinic established in Denmark has shown promising results in raising awareness about fertility (Birch Petersen et al., 2015; Hvidman et al., 2015). In addition, reproductive life planning and awareness about factors that influence fertility should be promoted in a range of settings, such as in school education (Kisby Littleton, 2012; Lucke, 2015), primary health care (Mazza et al., 2012) and in contraceptive counselling (Stern et al., 2013). In conclusion, data collected over 5 years indicate that the Your Fertility programme meets a need for targeted, evidence-based, accessible fertility-related information. Emulation of aspects of the programme may benefit other initiatives to promote fertility and reproductive health awareness.

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