

REVIEW ARTICLE

ACCESSING MODERN CONTRACEPTIVE TECHNOLOGIES IN INDIA

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Abstract : The 'unmet' need for reproductive health care in India requires a wide demand net. Besides 'supply' of oral contraceptives, condoms and IUDs, the 'non-supply' approach for increasing contraceptive prevalence is recommended through education about the variety of safe contraceptives and awareness in the use of traditional methods. Expansion of education is partly responsible for the recent decline in fertility in India, however, gender inequality still prevails with poor sex ratio in urban regions, and deficit of around 35 million girls and women from higher mortality compared to males till the age of 30. The community can become a key force in knowledge sharing for greater contraceptive prevalence and also to support its service sector. Practice of women's reproductive health involves complex socio-cultural-biological interaction in accessing modern contraceptive technologies. A number of interactive factors have been suggested to operate at different hierarchical levels to provide homeodynamic stability to the central event of reproductive health care under a central controller action, the government. While guidelines of the World Health Organization for quality care in family planning should be implemented in rural and urban sectors, efforts should also be made to translate recent advances in contraceptive technology from laboratory to service sector for improving women's reproductive health.

Key words : contraception reproduction unmet need women' health

The third decennial International Conference on Population and Development (ICPD) held in 1994 is a landmark in the history of global population management. It resulted in a paradigm shift in conceptualizing population policy from a top-down bureaucratic, target-driven programme as practiced in many countries including India, to a bottom-up approach that takes into cognizance issues like gender equality and women empowerment as key factors in implementing

the new population policy. It has also resulted in addressing core issues related to education, societal sanctities, economic and political will, women's perspective and awareness about her reproductive and sexual rights and freedom. It also appears imperative that an operative vision for enhancing access to contraceptive technologies, especially the improved, modern ones needs to be evolved in developing countries like India. A few slices of facts shown in Box justify it.

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Box 1

Φ1 76 million unintended pregnancies are reported every year in the developing world due to lack of family planning services^a.

Φ2 One in ten pregnancies end in an unsafe abortion, with Asia, Africa and Latin America accounting for the highest numbers. Each year, 19 million abortions are carried out under unsanitary or medically unfit conditions resulting in some 68,000 deaths^b.

Φ3 Poverty and gender discrimination results in poor reproductive health. Anaemia which can lead to post-partum hemorrhage affects 50–70 % of pregnant women in developing countries^c.

Φ4 Maternal death is practically nonexistent in developed nations. Primarily due to poverty and gender inequity in reproductive health matters there is death of one woman every minute in developing countries due to pregnancy related causes^d.

Φ5 Two thirds of maternal deaths in 2000 occurred in 13 of the world's poorest countries, and one quarter of these were in India alone^e.

Φ6 Based on the 1991 Census Data of India, a declining sex ratio from 934 to 929 females to 1000 males observed between 1981 and

1991 resulted from female fetocide, early childhood mortality and malnutrition^f.

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There is 'unmet' need in the reproductive health care. The 'unmet' need refers to the need of women and couples who wish to control their fertility but use no method. It includes (i) non-pregnant, non-amenorrheic women who wish to limit their family size, or wish to space births but are not using any contraceptives, (ii) women who are pregnant or amenorrheic, and (iii) women

who report their pregnancy as unwanted or mistimed pregnancy (1). The United Nations' 1999 review of implementation progress adopted benchmark indicators: *reduction of unmet need to half of 1990 levels by 2005* and *satisfaction of all stated fertility desires by 2015* (2). The UNFPA estimated that in 2004 some 137 million women had an 'unmet' need for contraception, another 64 million

were using traditional family planning methods that are less reliable than modern methods, and overall in developing countries, 29 per cent of women had an 'unmet' need for modern contraception (3). Clearly, there are manifold barriers to contraceptive use as shown in Box 2. We need to develop strategies aimed to discourage such practices, promote greater awareness in

reproductive health care along with better client-provider interaction to minimize the 'unmet' need.

In developing countries, many couples have little or no information of contraceptive practices but wish to control their fertility. Such underserved couples have only a limited number of choices available to them or they do not practice contraception. A large number of studies have proposed that education is a strong determinant of fertility; a strong impact of education on fertility decline has been reported and is considered partly responsible for India's recent fertility decline (4). The 1991 census data of India revealed a declining sex ratio from 934 in 1981 to 929 females to 1000 males in 1991, early childhood mortality, malnutrition, female fetocide may all be contributing factors (5). The West Bengal Health report for 2001 reveals an alarming decline in this ratio in the urban setting. Comparison of vital statistics, literacy rate, family welfare services in rural and urban settings of West Bengal in 2001 (see Box 3) reveals an alarming sex ratio of 893 in urban compared to 950 in rural settings albeit with a significantly higher literacy rate and a decreased total fertility rate in the urban population. Incomplete and poor degree of value-added education may be responsible for the gender inequity and decline in sex ratio found in West Bengal.

Women's autonomy that covers economic autonomy, physical autonomy, decision-making autonomy, emotional autonomy and knowledge autonomy are considered to be mediating factors in the causal pathways linking education and fertility. Beside a

Box 2

Major barriers to contraceptive use

Lack of accessible services for modern contraceptive techniques that include oral contraceptives, implants, injections and barrier methods (male and female condoms and diaphragms), and traditional methods including periodic abstinence, withdrawal and lactational amenorrhea (extended breastfeeding) and male and female sterilizations.

Lack of method choices appropriate to the situation of the woman and her family that address cultural sensitivities of bleeding or spotting side effects where blood taboos are prevalent.

Lack of knowledge about the use, safety, effectiveness and availability of contraceptive choices to the woman.

Lack of efficacious client-provider interaction.

Lack of support from the spouse and/or community.

Lack of financial support.

Reference

Rudy S, et al. 2003. "Improving Client-Provider Interaction." *Population Reports*. Series Q. No. 1. Baltimore, Maryland: The INFO Project, Center for Communication Programs, the Johns Hopkins Bloomberg School of Public Health. Web site: <http://www.infoforhealth.org/pr/q01/q01.pdf>.

Box 3		
Comparison of vital statistics, literacy rate, family welfare services in rural and urban settings of West Bengal in 2001^a		
	Rural	Urban
Percentage distribution of population	72.03	27.97
Sex ratio	950	893
Literacy rate	63.4	81.3
Birth rate	22.9	13.8
Death rate	7.2	6.4
Total fertility rate	2.7	1.6
Peri-natal fertility rate	32	17
Neo-natal fertility rate	34	19
Infant mortality rate	52	36

^aData based on: Health Report, 2003–04, State Bureau of Health Intelligence Directorate of Health Services, Government of West Bengal.

woman's own education that is considered in most studies on fertility, data based on Demographic Health Survey (DHS) reveals that husband's education was very important for good reproductive health (6). The role of social learning and the education of other women residing in the community and its impact on a woman's birth rate has also been well documented, substantiating the earlier proposal of 'mass education' as a key force behind fertility decline (7). The probability of adapting contraception is thus influenced not only by a woman's own education but also by that of others in her community. Community education operating through the use of maternity services and other preventive health services has been shown to have a clear impact on child mortality in India (8).

It is increasingly evident that a women's intent to practice contraception in addition to, assessing the unmet need is important. The intent to practice birth spacing and fertility regulation is likely to rest upon dynamic rather than static component, and is indeed dependent upon multiple factors. It may be associated with social pressures both within and outside her family, by the sudden death of a child, by economic pressures, lack of good family planning services, and non-availability of contraceptive agents.

Based on a survey conducted in rural Madhya Pradesh, a discrepancy was observed between *intent* and *practice* of contraception in a sub-sample of women who had participated in the National Family Health Survey-I (NHFS-I) in 1992–93 and again in 1999 (9). 51% women who were not practicing contraception but planned to do so had acted against their intention by 1999, as did 29% women who intended not to use contraception. Women who intended to use a method and not to have children were more likely to use a method by 1999. The age and death of child were reported to be strong factors associated with inconsistency between a woman's intention and behaviour. In order to reduce the 'unmet' needs a fair assessment of contraceptive intentions is likely to help in the development of family planning programmes by giving due attention to the needs of women who initially intended not to use contraception but do so after a gap of 6–7 years mainly due to attainment of family size (9).

Based on data from the NHFS-I and the NHFS-II it is apparent that the Reproductive

and Child Health Programmes conducted in India in 1992–1993 and again in 1998–1999 were guided by the ‘unmet’ need. While the ‘unmet’ need requires attention, the aim should be focused towards fulfilling the reproductive intentions of couples. Ravindran and Mishra observed that 69 women out of 70 women in rural Tamil Nadu had failed to achieve their reproductive intentions based on the HARI index (Helping Individuals Achieve their Reproductive Intentions) (10). Lack of education, and community support, improper counseling by health workers are the likely causative factors for women to resort to abortion of unwanted pregnancies, and use of herbal medicines advised by local midwives that often lead to reproductive tract infections and finally they undergo sterilization as a means of checking their unplanned and unwanted pregnancies.

It is amply clear that an understanding of the ‘unmet’ need for contraceptive use is critical towards developing a strategy towards increasing contraceptive prevalence. Contraceptive prevalence is a key to improved reproductive health and environmental health, and also to demographic and economic development. The heightened demand for effective family planning services for safeguarding reproductive health of women and her children clearly asks for a multilevel model approach so that available contraceptive technology is disseminated to the ‘user’ in a manner that it is understood and at the same time it is also available to the ‘user’ (see Box 4).

There is a marked increase in sexual activity in the adolescent population.

Box 4

Demand net for contraceptive services should address a wide category of people

Sexually-active unmarried teenagers

Women using less effective contraceptive method

Women using an effective contraceptive but use it incorrectly or are dissatisfied

Women with unwanted pregnancies having no access to safe and affordable abortive services

Women who have related reproductive health problems

Adolescents need access to information about sexual and reproductive health and contraceptive choices. They must be able to make their choice to prevent unwanted pregnancies based on informed knowledge of the health concerns and side effects of such contraceptives. Very often adolescents have wrong perceptions of reproductive health matters and consider that there is little risk of pregnancy following sexual activity, and exhibit at the same time an apparent ambivalence towards contraceptive practices that result in unplanned pregnancy (see Box 5). In general, adolescents have very little, if at all, access to reproductive information and counseling.

High teenage pregnancy rates reflect low levels of contraceptive use due to negative perceptions. A combination of sex education at school and an outreach programme rendering contraceptive service provision having close links involving the clinic, local

Box 5		
Reproductive health awareness of school-going adolescents in rural India^a		
	Boys (%)	Girls (%)
Awareness in:		
Immunization	61.5	58.7
Contraceptive	17.9	11.8
STDs	14.7	11.3
AIDs	33.9	26.1
Number of children desired:		
One child	5.7	17.6
Two child	70.6	72.9
Three children or more	23.7	9.4
Disadvantage of early marriage may lead to:		
Health problem to mother & child	39.7	46.1
Early pregnancy	1.9	3.3
Rapid population growth	17.9	7.4
Early responsibilities	10.9	8.7
Loss of education	4.1	7.6
Less opportunities	2.2	0.7
Freedom restricted	0.7	0.9
Not known exactly	22.5	25.4
^a Data taken from: Gupta N, Mathur AK, Singh MP, Saxena NC Reproductive health awareness of school-going, unmarried, rural adolescents. <i>Indian J Pediatrics</i> 2004; 71: 797-801.		

schools, youth services, social services and voluntary services in the UK resulted in significant rise in service access by young people (11). The ability of such clinic settings in providing outreach programme for counseling and quality care that have extended hours with no requirement of prior appointment provides for a model contraceptive service in urban setting. The outreach programme offering door-to-door

service that was found highly effective with urban, low-income slum settlers was one in which 'well baby' prizes were distributed based on parents' age at marriage and educational status, mother's age at first birth, immunization status of living children, birth interval, contraceptive use and general criteria of health and hygiene. In this manner health workers were able to reinforce and integrate the maternal child health care (MCH) programme, and it served as a tool to monitor the efficacy of local MCH services (12).

Longitudinal data analysis of 10-year community-based access to contraception in Bangladesh has provided a statistical model to determine the changes in reproductive behaviour and motives of respondents exposed to outreach activities (13). The strategy of doorstep distribution of maternal and child health and family planning services through routine visits by trained workers since its inception in 1978 has been instrumental in increasing the contraceptive prevalence rate (CPR), reducing fertility and attaining a considerably higher immunization coverage in children and women in Bangladesh. Economic appraisal of such labour- and cost-intensive programme has led to an alternative strategy in recommending fixed-site clinics or clinics at cluster spots for provision of health and family planning services complemented with reduced system of outreach workers to inform and target hard-to-reach clients as cost-effective service delivery system (14).

According to recent estimates 46 million women resort to abortion of unplanned or

unwanted pregnancies every year; of this 27 million undergo this traumatic event safely and around 19 million mostly belonging to the developing countries undergo unsafe abortion (15). It is crucial that efforts be made to prevent unintended pregnancy, and to provide contraceptive information and services to women of all ages.

What does contraceptive technology offer today? The introduction of the hormonal contraceptive approach was one of the most important events of the twentieth century for women. Although the availability of oral contraceptives (OCs) provided women with greater control of her reproductive lifestyle, long-term usage of OCs were associated with a few health concerns. In this context, while doctors, health care professionals and women should be kept informed of the latest research findings and their clinical implications, open scientific debates should be encouraged amongst experts and then only the conclusions placed before the public. Scientists have now addressed these issues by developing lower dose formulations and non-oral routes of hormone delivery systems. Increasing range of such options of long-term contraceptive systems delivering hormones via subdermal implants, vaginal ring, intrauterine system, and transdermal patch will afford convenient and effective alternatives to oral contraceptives and also provide greater degree of compliance for the individual user (16). Nestorone (R)/ethinylestradiol (NES/EE) based contraceptive vaginal ring is one such approach towards greater user acceptability since the vaginal route of drug administration has been shown to provide emergency contraception (17) and found to

have positive effect on the psychological aspect of both women and their partners (18). The use of contraceptive microbicides delivered via the vaginal route affords to women discrete protection against sexually transmitted diseases including HIV and at the same time provides to the user, freedom to exercise her reproductive rights in her own space and time domains. In this regard a number of potential options are now available which have shown high acceptability among women and their partners.

A systematic review and meta-analysis of all studies on long-term use of OCs published during 1980 to 2002 revealed that third generation low dose OCs increases the risk of both cardiac and vascular arterial events (19). Androgenic and non-androgenic OCs however provide significant reduction in ovarian cancer risk (20). Combined oral contraceptives alter the genital tract microenvironment with upregulated CCR5 expression in cervical intraepithelial CD4+T lymphocytes influencing users' susceptibility to HIV-1 transmission (21). HIV-1 seropositive women on hormonal contraceptives should thus be counseled for condom use due to their increased risk of cervicitis and cervical *chlamydia* infection (22). Differences in the pharmacodynamics of endogenous hormones have been found in women residing in Bolivia compared to women residing in USA providing thereby a biological basis of variations in women's tolerance of hormonal contraceptives and its compliance (23). Clearly the choice for effective contraception is limited and not sufficient to meet the varied needs of women throughout their reproductive lives. In recognition of

this unmet need for greater range of contraceptive choices the World Health Organization and the Rockefeller Foundation undertook an initiative to develop novel contraceptives as a method that a woman can take on only one occasion in any menstrual cycle on an 'as-needed' basis that would be free of the logistical difficulties and the known side effects associated with existing methods of family planning.

The physiological events associated with vascular functioning, development of new blood vessels (angiogenesis) and increased capillary permeability were identified as the new targets in methods to disrupt peri-ovulatory events and ovulation, uterine receptivity and embryo implantation (24, 25). Studies have identified new sets of angiogenic genes as novel targets for antiangiogenic therapies for contraception (26). The finding that progesterone, but not estrogen is critical for embryo implantation and pregnancy (27) led to the successful use of an antiprogestin, mifepristone either as a low-dose, once a month, post-coital agent or as low-dose emergency contraceptive for fertility regulation (28, 29). Use of mifepristone as a once-a-month contraceptive is an acceptable contraceptive option with minimal side effects though high degree of compliance is necessary along with the use of monitor to detect day of ovulation (30). In a multicentre trial conducted in 10 countries by the World Health Organization, low dose mifepristone (10 mg), levonorgestrel as two tablets (0.75 mg at 12 h interval) or as a single dose (1.5 mg) were very efficacious

for emergency contraception and could prevent pregnancies if taken within 5 days of unprotected intercourse (31). A greater awareness of the safety, efficacy and availability of emergency contraception (EC) is required to prevent unplanned pregnancies and induced abortions in India. Progesterone-regulated genes involved in receptivity and vascular integrity may become the future targets of tailored post-coital contraception to be used by women on 'as needed basis'.

A summary highlights the improved quality care in contraceptive choice (Box 6) and improved method choice (Box 7) in modern contraceptive technology. It is predicted that existing and new scientific information in contraceptive and reproductive health technology may influence strategic policies and global commitments towards improving human health conditions and thereby translate a second contraceptive revolution.

Finally, Box 8 provides a strategic vision of how reproductive health care management may be employed towards the use of modern contraceptive technologies in developing countries like India. The recent launching of the Public Health Foundation in India by the Prime Minister of India permit us to dream a new beginning in reproductive health care management in India that can only be sustained by the 'nine pillars of human dignity': Food, Sanitation, Education, Potable water, Health, Employment, Shelter, Environment and Security (32).

Box 6**Improving access to quality care in family planning^a**

Low Dose Combined Oral Contraceptives (COCs) inhibit ovulation. COCs can be used by women until menopause with no restriction based on parity; can be given immediately post-abortion; may alleviate symptoms of endometriosis and dysmenorrhoea; reduce risk of ovarian cancer. COCs should not be used by women who breastfeed <6 weeks to 6 months postpartum; nonbreast feeding women <21 days postpartum; by smokers; women with multiple risk factors for cardiovascular diseases; hypertension; women with deep venous thrombosis/pulmonary embolism; ischaemic heart disease; stroke; hyperlipidemias; complicated valvular heart disease; migraine; neurologic symptoms; breast cancer; diabetes >20 years; nephropathy/retinopathy/neuropathy associated with diabetes; gallbladder disease; active viral hepatitis; mild and severe cirrhosis; liver tumours; on drugs such as antibiotics, anticonvulsants, carbamazepine, barbiturates which affect liver metabolism.

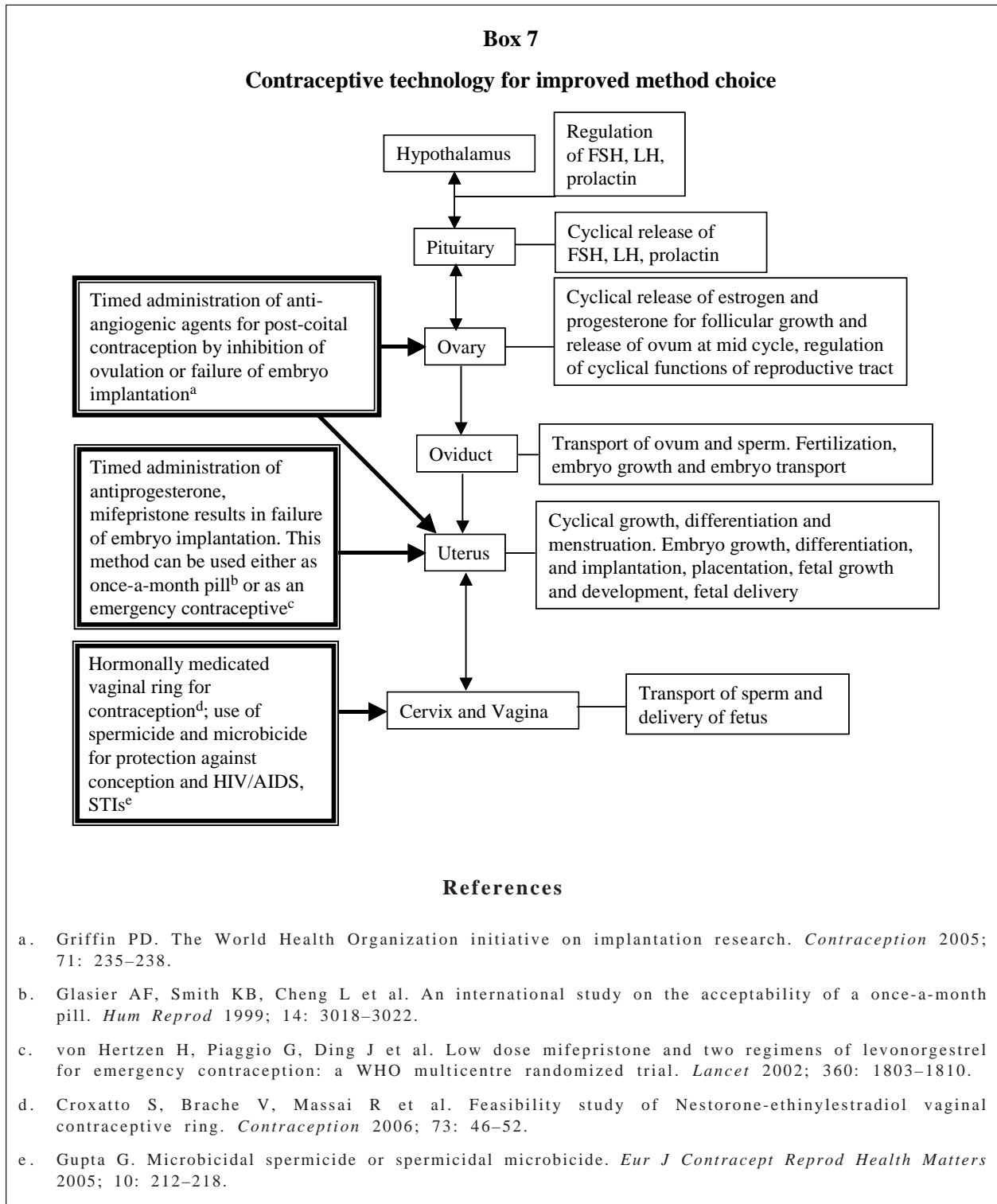
Combined Injectable Contraceptives (CICs) Cyclofem and Mesigyna provide for the release of natural estrogen plus a progesterone. The action of estrogen in CICs may be more physiologic and less potent than the synthetic estrogen present in COCs. The contraindications are the same as for the use of COCs.

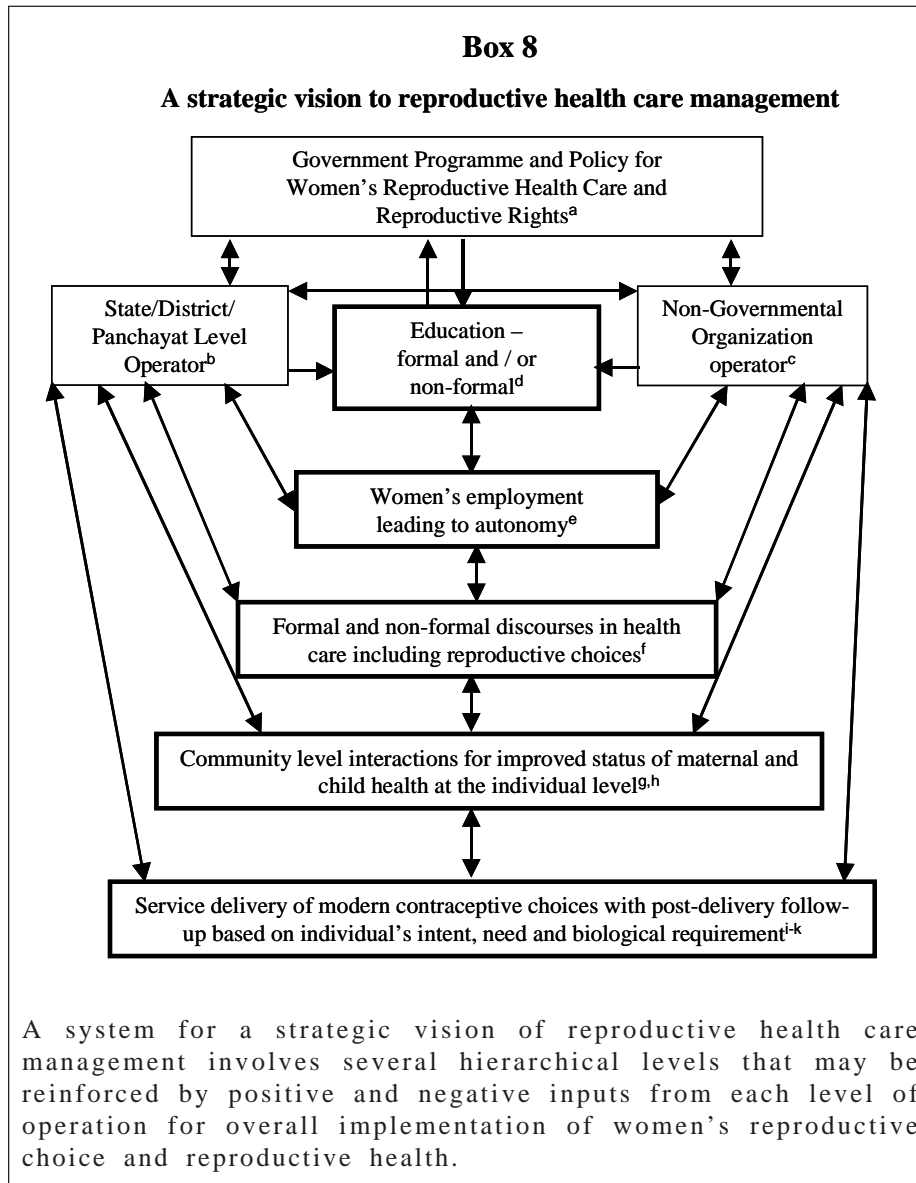
Progesterone Only Contraceptives (POCs) include the Progesterone-only-pill (POP), depomedroxyprogesterone acetate (DMPA)/norethisterone enantate (NET-EN), Norplant and Norplant II implants. POCs do not consistently inhibit ovulation, act on cervical mucus and tubal motility to inhibit sperm transport. POCs also affect endometrium and interfere with embryo

implantation. POCs may be given to non-breastfeeding women immediately postpartum and also to breastfeeding women though neonate may be at risk of exposure to steroid hormone; may be given immediately post-abortion; weight-gain with long-term POCs. POCs should not be used by women <6 weeks post partum; in women having deep venous thrombosis/pulmonary embolism; ischaemic heart disease; stroke; neurologic symptoms; breast cancer; severe cirrhosis; liver tumours. POP and Norplant should not be used by women on drugs such as antibiotics, anticonvulsants, carbamazepine, barbiturates which affect liver metabolism. Women showing unexplained vaginal bleeding should not use DMPA/NET-EN and Norplant. Women having neuropathy/retinopathy/neuropathy and other vascular diseases associated with diabetes should not use DMPA/NET-EN.

Intrauterine devices (IUDs) include copper containing IUDs and levonorgestrel-releasing IUD (20 µg/24 h) alter uterine milieu to prevent embryo implantation in the uterus. IUDs can be inserted immediately after first trimester spontaneous or induced abortion. IUDs should not be inserted during pregnancy because of serious risk to pelvic infection and septic spontaneous abortion. IUDs should not be inserted between 48 h and 4 weeks post partum and to women having puerperal sepsis; in women with anatomical abnormalities of uterus; unexplained vaginal bleeding; cancer of breast, endometrium or ovarian; uterine fibroids causing distortion of uterine cavity; benign or malignant trophoblastic disease; pelvic inflammatory disease; sexually transmitted diseases; HIV/AIDS; and in pelvic tuberculosis.

^aBased on data from: World Health Organization *Improving Access to Quality Care in Family Planning. Medical Eligibility Criteria For Contraceptive Use*. Second Edition, 2000.





Notes to Box 8

(a) <<http://mohfw.nic.in/reports/1997-98>> [This report highlights the Government of India's strategy towards family welfare in which there are 4 options in contraception services, sterilization as a terminal method; intrauterine device; oral contraceptive pill-Saheli, a non-

steroidal pill of indigenous origin and condom for birth spacing. Reproductive and Child Health Programme-Phase II operational from April 2005 aims to bring about inter-sectoral coordination at grass root level involving NGOs, Civil Societies, Panchayati Raj Institutions and

- Women's Group to bring down maternal mortality ratio and infant mortality rate.]
- (b) Peters DH The role of oversight in the health sector: the example of sexual and reproductive health services in India. *Reprod Health Matters* 2002; 10: 82–94. [The author stresses the need to use 3 main oversight functions: (a) understanding health system performance; (b) deciding when to intervene in the health system; (c) strategizing and implementing change, with a sound ethical basis for decisions, Governments can provide equitable, accountable and affordable services.]
- (c) Barua A, Waghmare R, Venkiteswaran S Implementing reproductive and child health services in rural Maharashtra, India: a pragmatic approach. *Reprod Health Matters* 2003; 11: 140–149. [Inherent weaknesses in the RCH II programme highlighted with data based on a 7 year operations research project to strengthen the programme in: (a) service delivery from household visit to clinic base; (b) stringent monitoring mechanisms; (c) in-service training of health workers; (d) range of services increased.]
- (d) Kumar PR, Walia I, Aggarwal AK Reproductive health intervention trial. *Indian J Pediatr* 2005; 72: 27–291. [Based on a study conducted in Chandigarh, India, effectiveness of reproductive health education in adolescent girls aged between 15–19 years was tested using conventional education programme and peer education. Both were effective, but peer strategy was less time consuming.]
- (e) Riyami Al, Afifi M, Mabry RM Women's autonomy, education and employment in Oman and their influence on contraceptive use. *Reprod Health Matters* 2004; 2: 144–154. [Using bivariate analysis the authors have shown that education was a better predictor of 'met need' than autonomy. The 'unmet need' for contraception declined significantly with education and paid employment.]
- (f) Paxman JM, Sayeed A, Buxbaum A, Huber SC, Stover C The India Local Initiative Program: A model for expanding reproductive and child health services. *Studies in Family Planning* 2005; 36: 203–220. [Model adopted in Indonesia and Bangladesh using community resources as local health personnel; community supplied clinic sites; community drug funds with matching donor funds implemented in 4 northern states in India involving 3 NGOs during 1999–2003.]
- (g) Geyoushi BE, Matthews Z, Stones RW Pathways to evidence-based reproductive health care in developing countries. *BJOG* 2003; 110: 500–507. [Based on a qualitative semi-structured interview based study in India and Yemen the authors conclude that clinical teachers were the nodal group having the strongest incentive to obtain and use new knowledge in reproductive health care and that clinical practitioners should have access to such knowledge.]
- (h) Stephenson R, Tsui AO Contextual influences on reproductive wellness in Northern India *Am J Public Health* 2003; 93: 1820–1829. [Multivariate modeling employed to estimate household and community-level effects on wellness with hierarchically organized data from survey of villages, urban, blocks, households, women, health-providers and staff. Communities found to influence wellness through socioeconomic environment and characteristics of health infrastructure.]
- (i) Ornstein RM, Fisher MM Hormonal contraception in adolescents: Special considerations. *Pediatr Drugs* 2006; 8: 25–45. [The contraception options available to adolescents have been discussed in light of non-contraceptive adverse effects that were outweighed by the significant morbidity associated with teenage pregnancies. Higher acceptability found with progesterone-only methods such as injectables and implantables as they avoid need for daily compliance, but irregular bleeding and amenorrhea was not acceptable to many girls. Emergency contraception or copper-releasing IUDs may be useful, and adolescents should be made aware of such choices and have easy access.]
- (j) Hennink M, Stephenson R Using research to inform health policy: barriers and strategies in developing countries. *J Health Commun* 2005; 10: 163–180. [3 key parties are involved: Donor agency for funds; Researcher for development of innovative contraceptive strategies; Health Policy Decisionmaker. A key barrier is the lack of appropriate packaging of research findings by the researcher and its dissemination to wider audiences to include donor agencies and health policy makers. Increased collaboration between the 3 parties essential to health programme delivery.]
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