IMPROVING MATERNAL NUTRITION THROUGH TARGETED FOOD SUPPLEMENT UNDER PUBLIC PRIVATE PARTNERSHIP: SWASTH VATSALYA YOJANA (SVY) – VADODARA DISTRICT INITIATIVE

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ABSTRACT

BACKGROUND: Maternal nutrition and health is considered as the most important regulator of human fetal growth. The pregnant woman should eat a wide variety of foods to make sure that her own nutritional needs as well as those of her growing fetus are met.

OBJECTIVE: The study was planned to assess the dietary intake and role of regular compliance of targeted food supplement to increase daily nutrient intake of nutritionally high risk pregnant women of under Swasth Vatsalya Yojana.

METHODOLOGY: Swasth Vatsalya Yojana (SVY) was a pilot project initiated under PPP by the district administration of Vadodara (Gujarat). Screening of all pregnant women was done from four PHCs of Vadodara district from August-October 2015. Criteria for identifying and enrolling nutritionally high risk women were anyone from following: Hb <7gm/dl, Weight <40kg, Height <140 cm, Weight not increasing by 2 consecutive months in 2nd trimester, Weight not increasing every month in 3rd trimester. Dietary pattern and nutrient intake of 100 nutritionally high-risk women from one block of Vadodara district was collected using 24 hour dietary recall method and food frequency questionnaire. Through CSR, nutridense biscuits were supplied daily to all the enrolled pregnant mothers with help of ASHAs and investigators who also monitored the compliance.

RESULTS: Ninety percent of the nutritionally high risk pregnant women had mean nutrient intake for energy, protein, calcium and iron was <50% of its Recommended Dietary Allowances (RDA) from home diet . The compliance of Supplementary nutrition from ICDS was reported to be poor. The targeted daily food supplement-biscuits under SVY facilitated improvement in nutrient intake for energy, protein, calcium and iron. Biscuits provided additional energy of 29%, protein 17%, calcium 22% and iron by 32% of the RDA.

CONCLUSION: Targeted daily supplementary food facilitated the improvement in maternal nutrition.

KEY WORDS: Maternal Nutrition Targeted Food Supplement, Home diet.

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INTRODUCTION

Pregnancy is a critical time of human development, and anything that comprises the fetal environment may have important and lasting effects on the child's future health. It is important as a society to prioritize helping women understand the impact that their lifestyle and dietary choices have on their children. Nutrition is a vital component of foetal development. Encouraging healthy lifestyle practices such as moderate physical activity and healthy dietary practices adhering to the recommended dietary allowances will create an impact not only on the child's long-term health, but potentially the mother's as well.

Maternal nutrition and health is considered as the most important regulator of human fetal growth. The pregnant/lactating woman should eat a wide variety of foods to make sure that her own nutritional needs as well as those of her growing foetus are met.

Improved diets for pregnant women, as well as specific interventions such as targeted balanced protein energy supplementation and multiple micronutrient supplementation in pregnancy, which have been proven to reduce SGA, should be implemented in ways to achieve high coverage in pregnant women who can benefit. Additional nutritional interventions, e.g. in adolescence and before conception, should be evaluated and implemented if found to be effective. Continuum of care throughout pregnancy, birth, and after delivery has become a key program strategy for improving the health of mothers and new-borns. Successful program implementation to improve the continuum of care relies on a better understanding of where the gaps are in seeking care along the pathway and what factors contribute to the gaps.

Maternal Health & Malnutrition in India and Gujarat

In India MMR were 174 deaths per 100,000 in 2015. IMR was 50% in 2009 which reduced to 40.5% in 2014, NMR was 28% in 2013, and fertility rate was 2.40%, in 2015.

According the NFHS 4 2015-2016 data in India the women whose Body Mass Index is below normal (BMI < 18.5 kg/m^2) were 22.9% in India whereas it is 27.2% in Gujarat. Surveys conducted by the **National Nutrition Monitoring Bureau (NNMB 2009), ICMR,** had shown steady reduction in the dietary intake of all food groups including cereals (millets) since 1975. Since mid-90s, the consumption of even cereals falls short of requirement. There has also been a sharp reduction in the intake of energy, protein, calcium and iron.

The MMR in Gujarat was 112 deaths per 100,000 in 2011-13, IMR was 36% in 2013, NMR was 26% and fertility rate was 2.3%, in 2013 according to Niti Aayog Government of India.

Swasth Vatsalya Yojana (SVY) is a pilot project initiated by district administration, Vadodara under PPP to improve pregnancy outcome (August 2015- January 2016).

AIMS AND OBJECTIVES OF SVY

- Identification and Screening of **HIGH RISK** pregnant mothers and their referral services to higher health facilities
- Providing optimal services for Antenatal Care and Postnatal Care.
- Promoting safe institutional delivery.
- Improving maternal and child health nutrition.
- Improving IMR & MMR in Vadodara District

METHODOLOGY

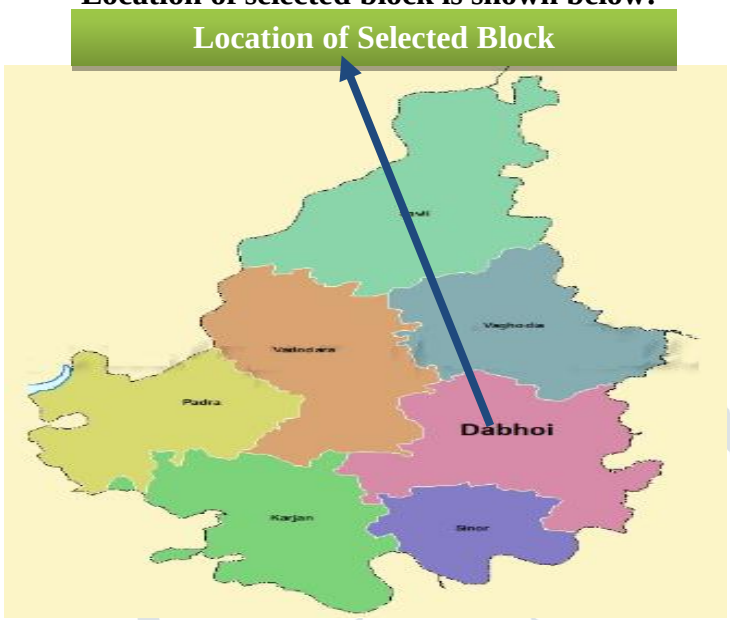
The present study was planned to assess the dietary intake and role of regular compliance of targeted food supplement to increase daily nutrient intake of nutritionally high risk pregnant women of under Swasth Vatsalya Yojana. Women from four Primary Health Centres of semi urban area of Vadodara district were enrolled.

The study was approved under the Department of Medical Ethics Committee (No.F.C.Sc/ IECHR/12). The Maharaja Sayajirao University of Baroda, Vadodara.

ENROLLMENT OF THE SUBJECTS

There are total 7 blocks in Vadodara district. Out of 7 blocks, 4 blocks belongs to semi urban area. One block-Dabhoi was purposively selected.

Location of selected block is shown below:



Source:https://www.mapsofindia.com/maps/gujarat/tehsil/vadodara.html#

After necessary ethical clearance and permission all pregnant women from 4 PHCS of Vadodara semi urban block were screened by health team of Jilla Panchyat from 5th August to 5th November 2015 and were enrolled under Swasth Vatsalya Yojana. Women were classified into nutritionally high risk based on following criteria.

Criteria for identifying and enrolling nutritionally high risk women were any **one** from following:-

- Hb < 7gm/dl,
- Weight <40kg
- Height <140 cm,
- Wt. not increasing by 2 consecutive months in 2nd trimester,
- Wt. not increasing every month in 3rd trimester

Data Collection: Hundred nutritionally high risk women in any trimester from 4 PHC's of Vadodara block were selected and were enroll for taking the dietary pattern by using 24 hours dietary recall and food frequency questionnaire. Tools used for collecting the data were pre-tested and semi structured questionnaire. Before enrolling the mother's for the study, informed consent was obtained. Data on dietary practices was collected on 90 mothers as 10 had abortions.

With our technical inputs targeted food supplements - Nutridense biscuits were developed. Composition and analytical values are given below.

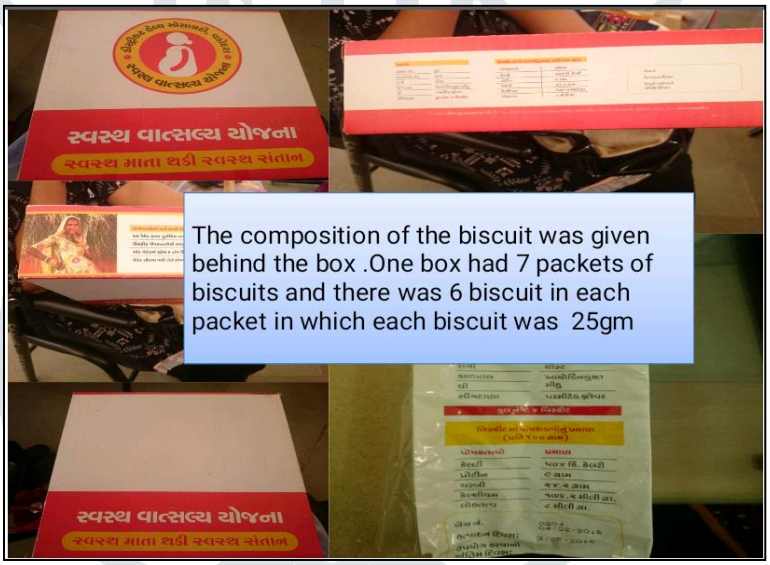
6 Biscuit/day

COMPOSITION

Ingredients	Amount(gm)
Wheat flour	40
Bajra	30
Ragi	30
Niger seeds	20
Groundnut	25
Milk buffalos	25
Butter	50
Yeast	Little
sugar	60

ANALYTIC VALUE

PARAMETERS	VALUE
Moisture%	4.2
Total Ash%	2.1
Fat(gm)	36.3
Protein(gm)	13.5
Carbohydrate(gm)	93.9
Sugar(gm)	36.9
Energy(kcal)	756.3
Calcium(gm)	264.3
Iron(mg)	12.03



Under PPP, renowned bakery of Baroda manufactured the biscuits and supplied to respective PHCs. Daily 150gram of biscuits (6 biscuits/pack) was supply to all the pregnant women by ASHA. It provided 756.3kcal, 13.5gms protein and 12mg iron.

All the nutritionally high risk pregnant mothers were followed up daily by ASHA for its compliance. Compliance cards were used to record the regular consumption of the biscuits and women's feedback about the same.

RESULT AND DISCUSSION

The general information such as type of diet, consumption of most common fruits and vegetables, daily meal pattern and avoidance of certain fruits & vegetables during pregnancy was also collected using pretested questionnaire. It was found that nearly 60 percent of women were vegetarian whereas half of the women generally consumed 3 meals in a day. Water intake of the pregnant women was not satisfactorily for 88 percent of the women as they generally drinks less than 3 lottas/day. Majority of the women had no practice of consuming any special food item during pregnancy. Only 11% reported women about consumption of special food like Methi Paak during pregnancy. Staple food was found to be wheat and rice. Out of 100 women enrolled, 10 women had abortion during the study period so data of 90 pregnant women is presented in this section.

NUTRIENT INTAKE OF WOMEN

The mean dietary intake was assessed in terms of nutrient intake using NIN book (Nutritive Value of Indian foods) and frequency of consumption of various food groups like cereals, pulses, green leafy vegetables, other vegetables, roots and tubers, fruits, nuts and oilseeds, meat & poultry and milk and milk products. Detailed dietary intake in terms of energy, protein, fat, iron, calcium was assessed through 24hr dietary recall method which is presented in Table 1.

Table 1 Mean Nutrient Intake (mean ± SD) of pregnant women by home diet + SVY

NUTRIENT INTAKE		Particulars		
		Home diet (N=90)	Targeted food supplement (N=90)	Total (N=90)
Energy (kcal)	Mean ± SD	870.99 ± 207.86	756	1626.99 ± 207.86
Protein (gm)		27.68 ± 11.04	13.5	40.88 ± 11.10
Fat (gm)		25.49 ± 7.34	12.5	37.99 ± 7.34
Calcium (mg)		347.12 ± 178.30	264.3	612.02 ± 178.30
Iron (mg)		9.95 ± 5.47	12	21.95 ± 5.47

The mean energy intake from home diet was 870.99 ± 207.86 Kcal whereas under Swasth Vatsalya Yojana targets food supplement - 150g of biscuits were eaten daily by all the pregnant women which provided 756 kcal of energy. Hence mean total energy intake per day was 1626.99 ± 207.86 which was far more than energy intake of women from their home diet.

The mean protein intake from home diet was 27.68 ± 11.04 gm whereas under Swasth Vatsalya Yojana, daily 150g of biscuits were eaten fully by all the pregnant women which provided 13.5gm of protein. Hence mean total protein intake per day was 40.88 ± 11.10.

The mean fat intake from home diet was 25.49 ± 7.34 gm under Swasth Vatsalya Yojana 150g of biscuits were eaten fully by all the pregnant women which provided 12.5 gm of fat. Hence mean total fat intake per day was 37.99 ± 7.34 gm.

The mean calcium intake from home diet was 347.12 ± 178.30 mg whereas under Swasth Vatsalya Yojana 150g of biscuits were eaten fully by all the pregnant women which provided 264 mg of calcium. Hence mean total calcium intake per day was 612.02 ± 178.30 mg.

The mean iron intake from home diet was 9.95 ± 5.47 mg .daily 150g of biscuits were eaten fully by all the pregnant women which provided 12mg of iron. Hence mean total iron intake per day was 21.95 ± 5.47 mg. It can be seen that targeted food supplement facilitated the increase in nutrient intake.

Ramachandran P. (2000) had also recommended that the dietary allowances for pregnant women should include an additional 300 kcal of energy and 10-15 percent of protein daily, over and above the recommended intake for the age – and weight matched person during the non- pregnant period.

PERCENT RDA FROM NUTRIENT INTAKE

Percent RDA from various nutrients were computed from home diet, Targeted food intervention (Biscuits) and total day's intake for women who were followed up every trimester presented is given Table 2. For majority of women, the mean nutrient intake from home diet for energy, protein, calcium and iron was <50% of its Recommended Dietary Allowances (RDA) (Table 2).

Table 2 Mean Nutrient Intake as percent RDA by pregnant women					
NUTRIENTS		Particulars			RDA
		Home diet (N=90)	Targeted food supplement (N=90)	Total (N=90)	
Energy (kcal)	<50% 50% -75% 76% - 100% >100%	85 (94.45) 5 (5.55) 0 (0) 0 (0)	29.09	2 (2.22) 82 (91.11) 6 (6.67) 0 (0)	**2599kcal**
Protein (gm)	<50% 50% -75% 76% - 100% >100%	77 (85.56) 11 (12.22) 2 (2.22) 0 (0)	17.31	51 (56.67) 32 (35.56) 5 (5.56) 2 (2.22)	**78gm**
Calcium (mg)	<50% 50% -75% 76% - 100% >100%	80 (88.89) 10 (11.11) 0 (0) 0 (0)	22.03	47 (52.22) 37 (41.11) 6 (6.67) 0 (0)	**1200mg**
Iron (mg)	<50% 50% -75% 76% - 100% >100%	85 (94.44) 4 (4.44) 0 (0) 1 (1.11)	31.58	29 (32.22) 54 (60) 5 (5.56) 1 (1.11)	**38mg**

Targeted food supplement provided 30% of RDA for energy, 17% of RDA for Protein, 22% of RDA for calcium and 31% of RDA for Iron. The nutrient contribution from targeted food supplement facilitated the increase in all the calculated nutrients. In case of energy intake, all the women who got <50% of RDA for energy shifted in the category of 50% -75% of RDA.

Similar result was found by Rao, et al. (2002) that the nutrient intake of pregnant women was significantly less than RDA. Also the consumption of calories, protein, iron and beta carotene was found to 18%, 21%, 85% and 57% respectively, which was less than half of the RDA. Also **Pathak, et al. (2004)** found that nearly 73. 4%, 26.3% 6.4% of the pregnant mothers were deficient in iron folic acid and iodine respectively in rural area of Haryana where over 19% of pregnant women were consuming less than 50% of the recommended calories. **Ospendarp, et al. (2000) reported** the consumption of macronutrient especially energy and protein and micronutrient such as iron, vitamin A and iodine as significantly lower than its RDA.

Frequency of consumption of various foods by pregnant women

The food frequency questionnaire included an exhaustive list of selected food groups and items which were known to be consumed by pregnant women. The consumption of these food items were noted in terms of daily, 2-3 times in a week, once in a week, sometimes, never, seasonally.
With regards to **energy giving food groups** cereals, the commonly consumed cereals were wheat, rice and bajra on daily basis. Almond, cashewnuts, pistachio nut, walnut, raisins were consumed occasionally. Nearly 90 percent of pregnant women reported that they never consumed garden cress seeds and gingelly seeds.

With regard to **protein rich foods**, Red gram dal was reported to be consumed on daily basis. Other legumes like green gram and peas were consumed 3 times in a week by nearly 50 percent. Curd and buttermilk were consumed by most of the women occasionally. Out of the total, more than 50% were vegetarian. Consumption of non-vegetarian foods like fish, chicken, was consumed rarely by most of the women who used to consume non vegetarian foods.

Fruits which are the major sources of **micronutrients,** Apple, Banana, Grapes, Orange, Daadam and Chiku were consumed only occasionally. Fruits like Mango, Seetaphal were consumed seasonally. Papaya was avoided by some of the women due to misbelief of its abortion inducing *(Baalak padi jaaye*) so as Banana *(thandu pade*).

Commonly consumed green leafy vegetables were Amaranth, Colocasia, Drumstick leaves, Fenugreek, cabbage, Spinach by most of the women. Other indigenous Glv's like Channanibhaji, Bhindanibhaji, Chillnibhaji were generally consumed once in a week by few women. Regarding other vegetables, Tomatoes were consumed daily by

1/3rd of the women. Vegetables like Bottle gourd, Bitter gourd, Cauliflower, Capsicum, Ladies finger, Kankoda were consumed either seasonally or sometimes.

Similar type of survey was carried out by **Godfrey et al. (1996)**a food frequency questionnaire (FFQ) to 538 women in early and late pregnancy and found that increasing carbohydrate intake in early pregnancy and increasing meat protein intake in late pregnancy was associated with decreased birth weight.

Mathews, et al. (1999) studied 693 subjects who completed a food diary in early pregnancy and a FFQ after 28 weeks and found higher vitamin C intakes in early pregnancy were associated with increased birth weight.

CONCLUSION

Daily compliance of Targeted food- biscuits facilitated increase in selected nutrient intake improving maternal nutrition.

RECOMMENDATION

Nutri dense recipes from indigenous food material should be promoted. Consumption of sufficient quantities of the supplements must be assured.

Nutrition Intervention in all the existing government programmes should be streamlined and intersectoral convergence should be promoted for appropriate service deliveries under the programme to improve maternal nutrition.

Conflict of Interest - None

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REFERENCES

- NFHS 4 India rchiips.org/nfhs/pdf/NFHS4/India.pdf
- NFHS 4 Gujarat rchiips.org/NFHS/pdf/NFHS4/GJ_FactSheet.pdf.
- NFHS 4 Vadodara rchiips.org/NFHS/FCTS/GJ/GJ_FactSheet_486_Vadodara.pdf
- **Prema Ramachandran (2000)**Maternal Nutrition—Effect on Fetal Growth and Outcome of Pregnancy Nutrition Reviews, Vol. 60, No. 5
- **Rao S, Yajnik CS, Kanade A, et al. (2001)** Intake of micro nutrient rich foods in rural Indian mothers is associated with the size of their babies at birth: Pune Maternal Nutrition Study. Journal of Nutrition. Vol; 131 (4):1217–1224
- **Pathak, Kapil, et al. (2004)** Prevalence of multiple micronutrient deficiencies amongst pregnant women in a rural area of Haryana. Indian J Pediatr. 2004 Nov; 71(11):1007-14.
- **OspendarpA Ladipo (2000)** Nutrition in pregnancy: mineral and vitamin supplements American Journal of Clinical Nutrition 2000
- **Godfrey K, Robinson S, Barker DJP, Osmond C, Cox V, et al.(1996)**. Maternal nutrition in early and late pregnancy in relation to placental and fetal growth. Bio Medical Journal Vol 312, 410–414.
- **Mathews F, Yudkin P, Neil A. et al (1999)** Influence of maternal nutrition on outcome of pregnancy: prospective cohort study. Bio Medical Journal. Vol; 319(7206):339–343.
- www.gujheath.gov.in
- www.wcd.nic.in
- www.nhm.nic.in