# Motivating Iron Supplement Take Up in Uttar Pradesh:

## A BeSci Literature Review to Inform Behavior Change Innovation and Testing


ASHOKA UNIVERSITY

Centre for Social and Behaviour Change

Yale SCHOOL OF MANAGEMENT
*Center for Customer Insights*

# Literature Review Approach

# The Yale Framework & Approach: Beliefs, Goals, Choices

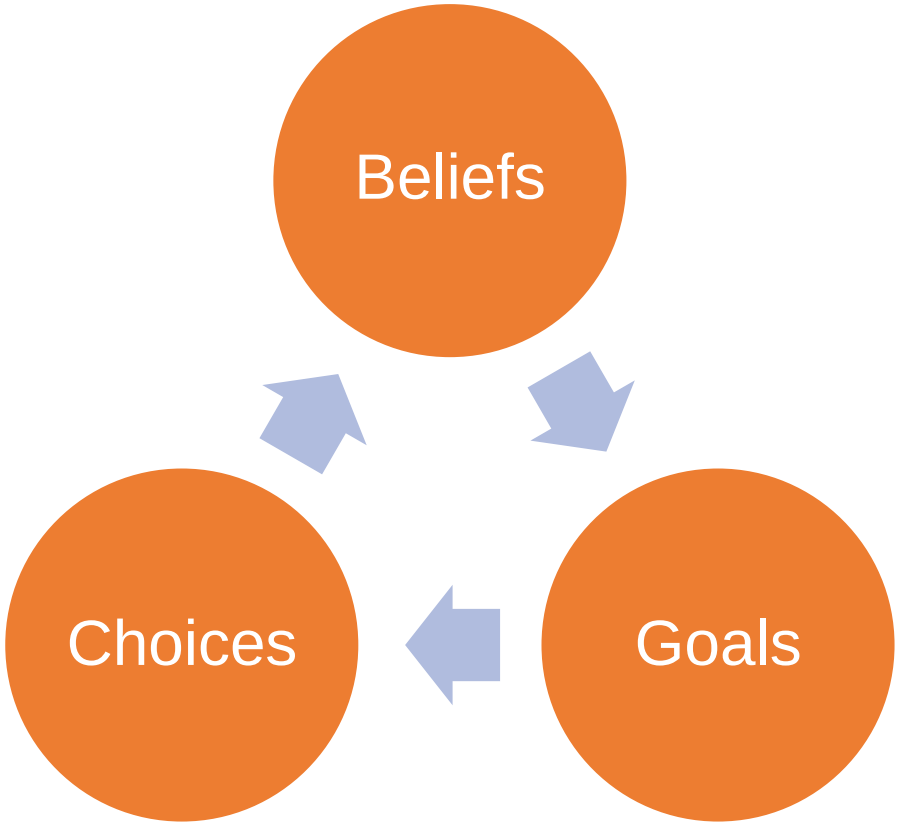
Behavioral economics explains that people don't make choices rationally, but rather choices are an interplay of 3 forces.

**Yale calls it the beliefs-goals-choice framework:**

***Beliefs***: Even before processing information, people's beliefs influence their decisions, whether by facilitating decisions or acting as barriers. These beliefs are grounded in prior experience and cultural norms.

***Goals***: Unlike needs that are thought of as fixed or stable, people have many goals and which goal is active can depend upon their internal state or their external environment

***Choices***: Ultimately, people make choices from a set of alternatives and heuristics, or nudges, often influence their choices.



# Research approach

Our review begins by identifying the beliefs and goals that serve as barriers and motivators for IFA treatments. Each section in the following review will begin with relevant beliefs, goals/motivators, followed by interventions that may overcome barriers or re-enforce motivators

Beliefs and goals are best identified through qualitative research, we focus this portion of the review on studies using in-depth interviews or focus groups



Identified beliefs and goals are then used to inform our review of behavior change interventions

# Criteria for intervention studies

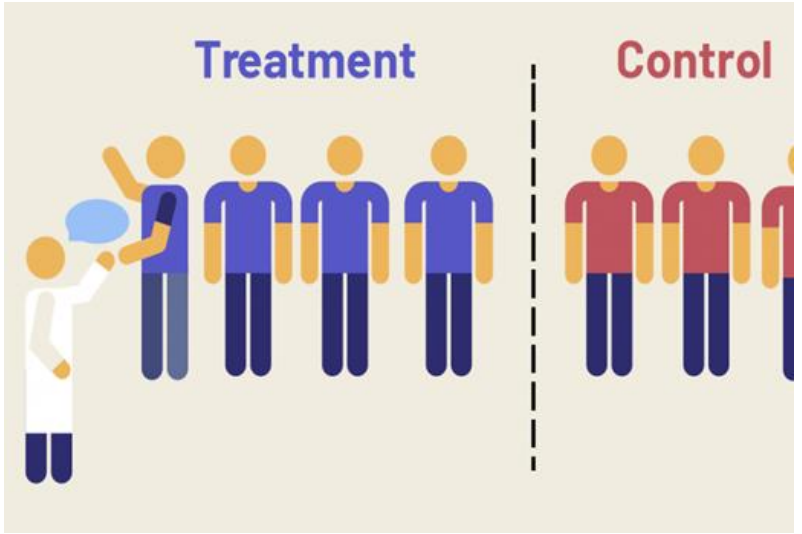
***Peer Reviewed***: Our review focused on peer-reviewed research that employed the following designs:

- experimental
- quasi-experimental
- pre vs. post
- descriptive correlation studies

***Significant***: Unless noted, studies included show results that are statistically significant using standard analytic methods. Key limitations are also included where applicable

***Geographic Focus***: This review focused on studies conducted in India but also includes research from other countries where results were deemed applicable

***Search Terms:*** This review began with Google scholar searches of terms including “anemia behavioral interventions”, “iron supplement adherence”, “perceptions of iron deficiency”, etc., but most studies were sourced from citations.



# Background & Challenge

# An estimated 53% of women of reproductive age and 58% of children are anemic in India

Anemia is a condition in which the number of red blood cells or the haemoglobin concentration within them is lower than normal. This results in symptoms such as fatigue, weakness, dizziness and shortness of breath, among others.*

In addition, the overall pooled birth prevalence (random effect) of neural tube defnects (NTD) in India is 4.5 per 1000 total births. The risk of NTDs can be reduced by consumption of adequate amounts of folic acid prior to conception and in early pregnancy**

*WHO, 2022

**Allagh, K. P., Shamanna, B. R., Murthy, G. V., Ness, A. R., Doyle, P., Neogi, S. B., ... & Wellcome Trust-PHFI Folic Acid project team. (2015). Birth prevalence of neural tube defects and orofacial clefts in India: a systematic review and meta-analysis. PloS one, 10(3), e0118961.

# Iron & Folic Acid Supplements

The most common causes of anemia include nutritional deficiencies, particularly iron deficiency. To combat anemia, iron supplementation has been successfully implemented in many countries.

In 2013, the National Iron Plus Initiative (NIPI) was launched in India to combat the increasing prevalence of anemia.

NIPI recommends that children aged 6–59 months should receive a preparation containing 20 mg elemental iron and 100 mcg folic acid twice a week.

For pregnant women, the recommendation is using 100 mg elemental iron and 500 mcg folic acid daily for 100 days beginning at 14–16 weeks of gestation.

Adequate amounts of folic acid during conception and pregnancy decreases the risks of neural tube defects as well as orofacial clefts, common birth defects in India.


Thomas, M. S., Demirchyan, A., & Khachadourian, V. (2020). How Effective Is Iron Supplementation During Pregnancy and Childhood in Reducing Anemia Among 6–59 Months Old Children in India?. Frontiers in Public Health, 8, 234.

# Key Actors

### Healthcare Providers

Healthcare workers typically prescribe IFA treatment as part of regular pre-natal care regimen

### Community Workers

Accredited Social Health Activist (ASHA) workers are trained to work as an interface between the community and the public health system and play a role in delivering and monitoring IFA treatments

### Family/Peers

Family, friends and peers play an important role in establishing social norms around IFA treatments

# Key Treatment Groups

**Non-Pregnant Women**
(53.2% anemic)

Non-pregnant women make up the largest sub-group of the Indian population suffering from anemia

**Children/Adolescents**
(58.6% anemic)

Anemia has been linked to poor motor and mental growth in children, leading to long-term impacts as adults

**Pregnant Women**
(50.4% anemic)

Given anemia doubles the risk of death during pregnancy, many interventions have targeted this vulnerable population

IndiaSpend, 2019

# Executive Summary

# Key barrier beliefs surrounding IFA

## Three Categories of Beliefs Serve as Barriers for Seeking and Taking IFA Treatments

***1. Treatment is Unnecessary***

Women believe symptoms of amenia are to be expected with pregnancy and family members often do not encourage treatment

***2. Treatment Has Adverse Side Effects***

Overproduction of blood, abnormally large babies and difficult childbirth are beliefs that serve as barriers to treatment

***3. Pills/Programs are Not Convenient or Trustworthy***

Free, government programs rely on outdated distribution strategies for low quality tablets

**Note**: Beliefs presented in this review are not meant to be exhaustive or representative of the entire population, but instead reflect key barriers that may inhibit treatment. Additional research is needed to identify barrier beliefs for specific populations or geographies

# Key motivator beliefs surrounding IFA

## Beliefs That Serve as Motivators for Seeking and Taking IFA Treatments

***1. IFA Treatments Help My Baby Grow***

IFA supplements are like fertilizers for fetal growth

***2. IFA Treatments Will Make My Child Smart***

IFA supplements help drive brain development and give my child the best chance of being smart

***3. IFA Treatments Mean I Am Doing My Best as a Parent***

I want to do everything I can for my child and IFA tablets are one way I can do that

**Note**: Beliefs presented in this review are not meant to be exhaustive or representative of the entire population, but instead reflect key barriers that may inhibit treatment. Additional research is needed to identify barrier beliefs for specific populations or geographies

# Key learnings from intervention review

| Increasing Education & Awareness | Developing Social Norms | Innovating Treatment Administration | Creating Habits via Reminders |
|---|---|---|---|
| Spreading education and awareness about IFA treatments helps drive adherence | Developing a social norm around seeking and taking IFA treatment drives adherence | Developing and testing innovations in treatment administration drive adherence | Creating habits and setting reminders help drive adherence |
| Jump to Education & Awareness Section | Jump to Social Norms Section | Jump to Innovation in Treatment Section | Jump to Creating Habits via Reminders Section |

# Linking Barriers, Motivators and Interventions

| Beliefs | Barrier/ Motivator | Related Interventions | Potential Actionability |
|---|---|---|---|
| Treatment is Unnecessary | Barrier | Social Norms | Increasing social norm around IFA adherence among community members and family may drive increased uptake |
| Treatment Has Adverse Side Effects | Barrier | Education/Awareness | Disseminating information about the limited risks and high benefits of IFA through healthcare professional, community members and peers may drive increased adherence |
| Tablets are Not Trustworthy | Barrier | Education/Awareness & Social Norms | |
| Programs are Not Convenient | Barrier | Innovating Treatment Administration | Make finding and adhering to treatments easy through increased access and simple communication tools to track adherence |
| Treatments Help My Baby Grow | Motivator | Innovating Treatment Administration & Creating Habits | Reinforce positive beliefs by making treatment easier/more convenient and developing mechanisms to help develop habit of adherence |
| Treatments Make My Baby Smart | Motivator | Innovating Treatment Administration & Creating Habits | |
| Treatments Make Me a Good Parent | Motivator | Innovating Treatment Administration & Creating Habits | |

# Increasing IFA Uptake: Lessons from Previous Research

# Social Norms

# Beliefs That Treatment is Unnecessary Limit Adherence

Qualitative

# Barrier Belief: Weakness during pregnancy is normal and does not need to be treated

*A pregnant woman has to carry another body within her, this is something new for her body and she may get tired because of this. That is why she experiences giddiness and other symptoms.*
*-20 year old mother with one child*

Galloway, R., Dusch, E., Elder, L., Achadi, E., Grajeda, R., Hurtado, E., ... & Stephen, C. (2002). Women's perceptions of iron deficiency and anemia prevention and control in eight developing countries. Social science & medicine, 55(4), 529-544.

Qualitative

# Barrier Belief: The woman's health is the least important

“They [women] don’t give themselves importance. They immediately go to the hospital and bring medicines for their husbands and children and they sacrifice their own health.”
- Doctor

Sedlander, E., Long, M. W., Mohanty, S., Munjral, A., Bingenheimer, J. B., Yilma, H., & Rimal, R. N. (2020). Moving beyond individual barriers and identifying multi-level strategies to reduce anemia in Odisha India. *BMC Public Health*, *20*(1), 1-16.

Qualitative

# Barrier Belief: Mothers-in-law may give first-time moms bad advice about iron supplementation

“We never had those tablets. We had no idea that we are pregnant until the 5th month but women of today know everything from the 1st month and run to the hospital.”
- Mother-in-Law

"Their in-laws scolded me by accusing me that the iron tablet made the baby overweight inside the womb for which caesarian section was necessary. You may hear them [mothers-in-law] say, “You don’t take more! She has told you take two tablets, you take only one.”
- Midwife

“I have never seen men asking their wives to stop taking the tablets. It is either the women themselves who don’t take or the mothers-in-law ask them not to take.”
- Doctor

*Sedlander, E., Long, M. W., Mohanty, S., Munjral, A., Bingenheimer, J. B., Yilma, H., & Rimal, R. N. (2020). Moving beyond individual barriers and identifying multi-level strategies to reduce anemia in Odisha India. BMC Public Health, 20(1), 1-16.*

Qualitative

# Barrier Belief: If my mother didn't need this, I don't either

*"If our mothers could have a normal and safe delivery despite having this condition, then what is the need to take this seriously?"*
*-33 year old w/ one child*

Chatterjee, N., & Fernandes, G. (2014). 'This is normal during pregnancy': a qualitative study of anaemia-related perceptions and practices among pregnant women in Mumbai, India. Midwifery, 30(3), e56-e63.

Qualitative

# Barrier Belief: My husband does not support my treatment

"When I inform my husband about the problem, it goes into one ear and out the other; he says this problem will be all right on its own."

Galloway, R., Dusch, E., Elder, L., Achadi, E., Grajeda, R., Hurtado, E., ... & Stephen, C. (2002). Women's perceptions of iron deficiency and anemia prevention and control in eight developing countries. Social science & medicine, 55(4), 529-544.

# How Social Norms Can Address Barrier Beliefs: Existing Research

Women

Correlation

# Beliefs that other community members think you should take IFA even when not pregnant drive intentions

**Context:**

Some progress towards reducing anemia in pregnant women, but non-pregnant women, who make up the largest subgroup of people with anemia, are largely disregarded.

**Design:**

Data was collected from 3,914 randomly sampled non-pregnant women of reproductive age in 81 villages.

The data were analyzed using linear regression models beginning with demographics and social norms and adding other factors such as self-efficacy to take iron supplements, anemia risk perception, and knowledge about anemia in a subsequent model.

Sedlander, E., Long, M. W., Bingenheimer, J. B., & Rimal, R. N. (2021). Examining intentions to take iron supplements to inform a behavioral intervention: The Reduction in Anemia through Normative Innovations (RANI) project. *PloS one*, *16*(5), e0249646.

Women

Correlation

# Beliefs that other community members think you should take IFA even when not pregnant drive intentions

**Results showed a high correlation between beliefs in injunctive norms (e.g. how many *other women* think you should take IFA) and intentions to take IFA, a stronger correlation than descriptive norms (.13) knowledge about IFA (.13), and outcome expectations (.38)**

**Descriptive Norms:**
Belief that many women in the community take IFA regularly, even when not pregnant.

**.13**

**Injunctive Norms:**
Belief that others in the community think you should take IFA tablets even when not pregnant.

**.40**

*Association between norms measures & intentions to take IFA (r)*

Sedlander, E., Long, M. W., Bingenheimer, J. B., & Rimal, R. N. (2021). Examining intentions to take iron supplements to inform a behavioral intervention: The Reduction in Anemia through Normative Innovations (RANI) project. *PloS one*, *16*(5), e0249646.

Women

Correlation

# Beliefs that other community members think you should take IFA even when not pregnant drive intentions

**Expectations of other women in the community**

.06

**Expectations of their mother-in-law**

.06

**Expectations of their husband**

.08

*Association between specific norms measure & intentions to take IFA (p<.001)*

Sedlander, E., Long, M. W., Bingenheimer, J. B., & Rimal, R. N. (2021). Examining intentions to take iron supplements to inform a behavioral intervention: The Reduction in Anemia through Normative Innovations (RANI) project. *PloS one*, *16*(5), e0249646.

Pregnant Women

Correlation

# Husbands being present at pre-natal medical visits associated with significantly higher iron adherence

**Context:**

Iron deficiency during pregnancy is identified as a serious public health problem in India, where the majority of the pregnant women are anemic due to a variety of biological and socioeconomic reasons. The purpose of this study is to assess the factors influencing the consumption of Iron and Folic Acid (IFA) supplementation in high focus states of India.

**Design:**

This study is based on National Family Health Survey data of 11085 recently-delivered women. Correlational variables: religion, place of residence, women, education, birth order, wealth index, husband's education, husband's occupation, type of caste/tribe, and husband present during antenatal care (ANC) visit were taken as predictors. Women who received at least 90 IFA tablets were considered as outcome variable.


Chourasia, A., Pandey, C. M., & Awasthi, A. (2017). Factors influencing the consumption of iron and folic acid supplementations in high focus states of India. *Clinical Epidemiology and Global Health*, *5*(4), 180-184.

Pregnant Women

Correlation

Husbands being present at pre-natal medical visits associated with significantly higher iron adherence

**Pregnant women are 2.2x more likely to adhere to iron pill course if her husband attended pre-natal appointments.**

Chourasia, A., Pandey, C. M., & Awasthi, A. (2017). Factors influencing the consumption of iron and folic acid supplementations in high focus states of India. *Clinical Epidemiology and Global Health*, *5*(4), 180-184.

Women

Randomized controlled trial

# Improving social norms around IFA is associated with increased adherence

**Context:**

To assess whether improvements in social norms related to iron and folic acid consumption are associated with increased iron and folic acid consumption.

**Methods**:

A cluster randomized trial in Odisha, India, implemented an intervention to improve descriptive norms (people's perceptions about how many other people take iron and folic acid), injunctive norms (social pressures people feel to take iron and folic acid) and collective norms (actual levels of iron and folic acid consumption).

Changes in these norms and self-reported iron and folic acid consumption in control and intervention arms were assessed after 6 months. Data was collected from control (n = 2048) and intervention (n = 2060) arms at baseline and follow-up (n = 1966 and n = 1987, respectively).

Rimal, R. N., Yilma, H., Sedlander, E., Mohanty, S., Patro, L., Pant, I., ... & Behera, S. (2021). Iron and folic acid consumption and changing social norms: cluster randomized field trial, Odisha, India. Bulletin of the World Health Organization, 99(11), 773.

Women

Randomized controlled trial

# Improving social norms around IFA is associated with increased adherence

**Results:**

Social norms can be improved, and these improvements are associated with positive behavioral changes

**Norms Tested:**

*Descriptive Norms*: communicated that more and more women were beginning to consume iron and folic acid to reduce anaemia

*Injunctive Norms*: depicted the level of support that women of reproductive age could expect to receive from others in their communities (friend, family, officials)


*Mean iron and folic acid consumption at follow-up*

*NOTE: because of some participant attrition between baseline & 8 weeks, the statistical power was low (p=0.13)

Rimal, R. N., Yilma, H., Sedlander, E., Mohanty, S., Patro, L., Pant, I., ... & Behera, S. (2021). Iron and folic acid consumption and changing social norms: cluster randomized field trial, Odisha, India. Bulletin of the World Health Organization, 99(11), 773.

# Social Norms: Opportunities for further study

***1. Activating Social Norms***

To establish treatment as a social norm, research might seek to identify ways to make treatment more visible. For example, testing messaging around increased adherence rates may help drive individuals to seek treatment.

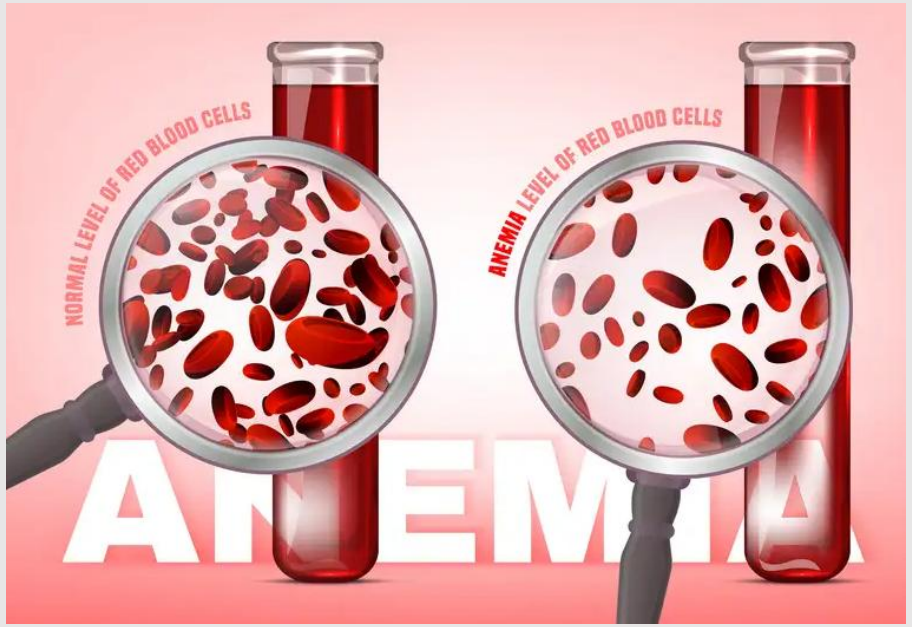
***2. Measuring Uptake***

Current research has linked social norms to intention to take IFA but additional research might seek to measure actual uptake in order to identify if an intent/behavior gap exists.

# Education & Awareness

# Barrier Beliefs About Quality and Side Effects Deter Treatment

# Belief: Anemia is a lack of blood in the body, IFA pills cures this anemic reaction




"We aren't able to have proper food which creates blood in our body. These tablets (IFA) help in creating blood."
- Pregnant Woman

"They have lack of blood because food is not right. They only eat salt and watered rice."
- Natural Healer

Sedlander, E., Long, M. W., Mohanty, S., Munjral, A., Bingenheimer, J. B., Yilma, H., & Rimal, R. N. (2020). Moving beyond individual barriers and identifying multi-level strategies to reduce anemia in Odisha India. *BMC Public Health*, *20*(1), 1-16.

Qualitative

# Belief: Taking too much iron could result in a woman having too much blood

Because iron supplements “increase blood” in these study populations, some women believe that they will bleed more profusely during delivery if they consume iron during pregnancy.

Galloway, R., Dusch, E., Elder, L., Achadi, E., Grajeda, R., Hurtado, E., ... & Stephen, C. (2002). Women's perceptions of iron deficiency and anemia prevention and control in eight developing countries. Social science & medicine, 55(4), 529-544.

Qualitative

# Belief: IFA tablets can make babies bigger, resulting in difficult or dangerous births

"They fear IFA as some ladies tell them that the child will grow big in your womb."
- Mother-in-Law

"They think that the child will be born healthy [if you take IFA] but they also fear that the child will grow big in your womb."
- Husband

"In the tribal regions towards Koraput, people believe that iron tablets may increase the size of the child. Here they used to think so but now there is nothing such in our locality."
- Front-line Healthcare Worker

Sedlander, E., Long, M. W., Mohanty, S., Munjral, A., Bingenheimer, J. B., Yilma, H., & Rimal, R. N. (2020). Moving beyond individual barriers and identifying multi-level strategies to reduce anemia in Odisha India. *BMC Public Health*, *20*(1), 1-16.

# How Education & Awareness Address Barrier Beliefs: Existing Research

Adolescent Girls

Pre/Post

# Life skills training in conjunction with tablets decreased prevalence of anemia

**Context:**
The objective was to study the 'effectiveness' of a weekly iron-supplementation regimen among urban-slum, rural, and tribal girls of Nashik district, Maharashtra, India.

**Methods**:

The Project covered 498,793 people from four tribal, four rural blocks of Nashik district, and all the urban slums of Nashik city. **These girls were given weekly supplementation with iron folic acid tablets and were trained in life-skill training sessions for three hours every day for three days. The training module aimed at educating the beneficiaries on nutrition and adolescent issues, such as family and gender differences, adolescence and accompanying changes, and pregnancy and related issues.**

**Anganwadi Workers of the Integrated Child Development Services Scheme carried out these activities in their areas. The distribution of iron folic acid tablets was facility-based, i.e. anganwadi.**


Deshmukh, P. R., Garg, B. S., & Bharambe, M. S. (2008). Effectiveness of weekly supplementation of iron to control anaemia among adolescent girls of Nashik, Maharashtra, India. Journal of health, population, and nutrition, 26(1), 74.

Adolescent Girls

Pre/Post

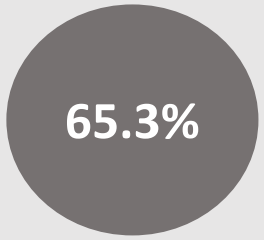
# Life skills training in conjunction with tablets decreased prevalence of anemia

**Results:**

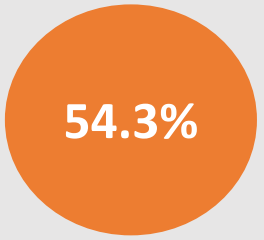
The overall prevalence of anaemia came down significantly at the time of evaluation (after 30 months of intervention) to 54.3% from 65.3%.

The decline was statistically significant ($p<0.001$) among the tribal girls (48.6% from 68.9%) and among the rural girls (51.6% from 62.8%). However, the decline was not statistically significant among the urban slum girls

**Control group**




**Treatment group**




Baseline and mid-term prevalence of anaemia

| Area | Baseline prevalence (n=360) | Mid-term prevalence (n=300) | p value |
|---|---|---|---|
| Tribal | 248 (68.9) | 146 (48.6) | <0.001 |
| Rural | 226 (62.8) | 155 (51.6) | <0.001 |
| Slum | 231 (64.2) | 188 (62.7) | >0.05 |
| Total | 705/1,080 (65.3) | 489/900 (54.3) | <0.001 |

Deshmukh, P. R., Garg, B. S., & Bharambe, M. S. (2008). Effectiveness of weekly supplementation of iron to control anaemia among adolescent girls of Nashik, Maharashtra, India. Journal of health, population, and nutrition, 26(1), 74.

Adolescent Girls

Pre/Post

# Using teachers to supervise treatment and spread education reduced anemia rates

**Context:**

This study was undertaken to institutionalize once a week IFA supplementation in the schools for adolescent girls with built in compliance monitoring in one district and scale up the program from its learning to all the districts as feasible.

**Methods**:

Education Inspectors were assigned responsibility to **supervise and motivate teachers to try out innovative ideas to promote the program**. Intervention included supervised iron supplementation once a week, dietary advice and health education on anaemia by various other promotional activities like essay, slogan competitions, etc.

For out of school girls, one approach was to ask schoolgirls to find 3 out of schoolgirls and provide them with education and IFA tablets. The other approach was through Integrated Child Development Services (ICDS) aanganwadi worker (AWW).

Kotecha, P. V., Nirupam, S., & Karkar, P. D. (2009). Adolescent girls' anaemia control programme, Gujarat, India. Indian J Med Res, 130(5), 584-9.

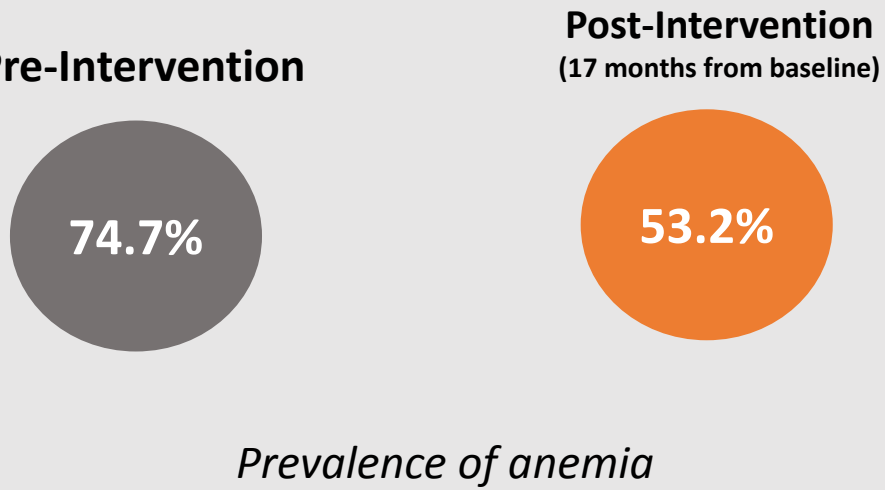
Adolescent Girls

Pre/Post

# Using teachers to supervise treatment and spread education reduced anemia rates

**Results:**

- Impact evaluation showed reduction in anemia prevalence by 21.5%. Reduction in rural areas was even greater, dropping from 74.5% to 50.4%. Findings may provide support for strategies aimed at out-of-school children (social sharing)




*Prevalence of anemia*

**Table I.** Prevalence of anaemia before and after intervention

| | Anaemia prevalence | | | | $\chi^2$ test |
|---|---|---|---|---|---|
| | Before intervention | | After intervention | | |
| Area | N | Prevalence | N | Prevalence | P value |
| Rural | 977 | 74.5 | 986 | 50.4 | < 0.05 |
| Tribal | 895 | 73.7 | 775 | 57.5 | < 0.05 |
| Urban | 988 | 75.8 | 1005 | 52.5 | < 0.05 |
| Total | 2860 | 74.7 | 2766 | 53.2 | < 0.05 |

Kotecha, P. V., Nirupam, S., & Karkar, P. D. (2009). Adolescent girls' anaemia control programme, Gujarat, India. *Indian J Med Res*, *130*(5), 584-9.

Children

Pre/Post

# Using school children to disseminate important information about iron supplements


**Context:**

The fortification of foods is often regarded as the most cost-effective long-term approach to reducing the prevalence of Fe deficiency.

**Design:**

In an uncontrolled, before–after, community-based study in urban & rural counties of Hebei Province, China, social mobilization and social marketing strategies were applied.

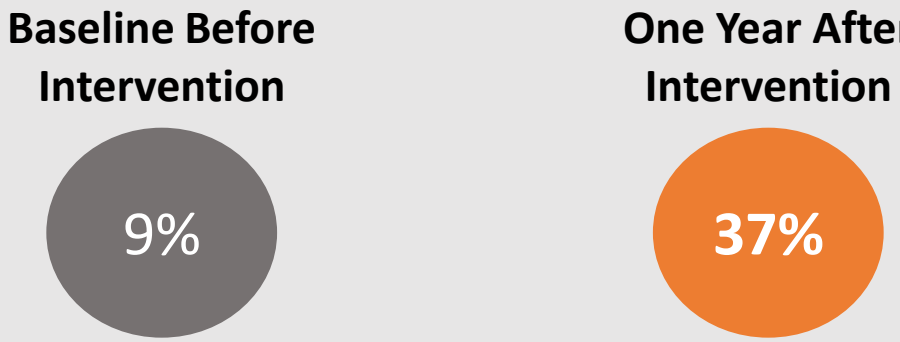
Wang, B., Zhan, S., Sun, J., & Lee, L. (2009). Social mobilization and social marketing to promote NaFeEDTA-fortified soya sauce in an iron-deficient population through a public–private partnership. *Public health nutrition*, *12*(10), 1751-1759.

Children

Pre/Post

# Using school children to disseminate important information about iron supplements

In this intervention, school children were mobilized to distribute information, education, and communication materials to the whole gamily after they learned relevant lessons through specially-designed classes. This, in combination with training of community health workers and store employees, led to a large increase in the percentage of women purchasing fortified soy sauce after intervention.




*Percentage of women in the intervention area who had ever purchased fortified soy sauce*

Wang, B., Zhan, S., Sun, J., & Lee, L. (2009). Social mobilization and social marketing to promote NaFeEDTA-fortified soya sauce in an iron-deficient population through a public–private partnership. *Public health nutrition*, *12*(10), 1751-1759.

Pregnant Women

Pre/Post

# Community-based strategies, such as positive deviance approach, can impacts pre-natal iron supplement intake

**Context:**

The aim of this study was to measure the impact of a positive deviance approach to improve an iron-supplementation program among pregnant women in rural Senegal.

**Design:**

A positive deviance approach (PD Micah) was compared with an ongoing integrated nutrition and health program intervention (Micah) in a rural Senegalese area. A pre-post evaluation was conducted using independent cross-sectional samples with a total of 371 pregnant women.

Ndiaye, M., Siekmans, K., Haddad, S., & Receveur, O. (2009). Impact of a positive deviance approach to improve the effectiveness of an iron-supplementation program to control nutritional anemia among rural Senegalese pregnant women. *Food and nutrition bulletin*, *30*(2), 128-136.

Pregnant Women

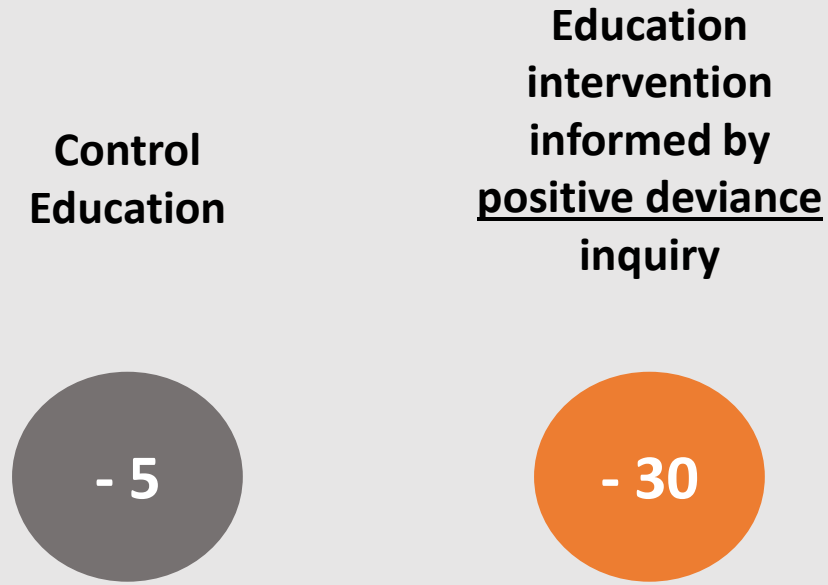
Pre/Post

# Using best practices from role models in the community can impacts pre-natal iron supplement intake

**Researchers conducted a 'positive deviance inquiry' to understand the barriers and facilitators associated with iron supplementation in a rural Senegalese community. Women were surveyed on their attitudes and beliefs about anemia, practices, history of disease, and dietary habits. Positive deviant practices were incorporated into the intervention.**

**Non-anemic, *deviant women*, were more likely to:**

- Have knowledge about the role of iron supplementation and the link between anemia and malaria
- Attend health centers for prenatal consultation & deliver in health facilities
- Have a positive attitude towards health services
- Take advice from elderly women in the community
- Be willing to take iron supplements




*Percentage point drop in prevalence of anemia following the intervention following 9 months of activity*

Ndiaye, M., Siekmans, K., Haddad, S., & Receveur, O. (2009). Impact of a positive deviance approach to improve the effectiveness of an iron-supplementation program to control nutritional anemia among rural Senegalese pregnant women. *Food and nutrition bulletin*, *30*(2), 128-136.

Pregnant Women

Quasi-experiment

# Concrete protocol for how to correctly approach iron supplementation resulted in lower anemia rates

**Context:**

Sri Lanka has a policy of free provision of iron supplements to pregnant women. However, iron deficiency anemia remains common in pregnancy. Compliance may be a major factor at fault—one study showed only 58% of pregnant women took iron supplements as prescribed.

**Design:**

This study tested the hypothesis that educating women regarding improving bioavailability (the ability of a drug or other substance to be absorbed and used by the body) could improve the efficacy of iron supplementation. The education focused on how best supplements could be taken and on how they should be stored. The researchers used a quasi-experimental design on a group of women attending for antenatal care at a suburban University Obstetric Unit in Sri Lanka.

A quasi-experimental design was used. A group of 115 consecutive women between 16–20 weeks of gestation giving informed written consent were recruited as the control group. A similar study group was recruited from the same antenatal clinic after the final assessment of the control group was completed. This was done to ensure that there would be no contamination of the control group.


Senanayake, H. M., Premaratne, S. P., Palihawadana, T., & Wijeratne, S. (2010). Simple educational intervention will improve the efficacy of routine antenatal iron supplementation. *Journal of Obstetrics and Gynaecology Research*, *36*(3), 646-650.

Pregnant Women

Quasi-experiment

# Concrete protocol for how to correctly approach iron supplementation resulted in lower anemia rates

**Complementing free iron supplementation with education about how to maximize the bioavailability of Fe was successful at lowering anemia levels in pregnant women in Sri Lanka.**

1. Store the iron tablets in an airtight container that is impervious to light
2. Take the iron tablet with the vitamin C tablet
3. Take the iron tablets every night
4. Take the iron tablet at least 2 h after the night meal
5. Avoid taking iron and calcium tablets together
6. Avoid taking tea, coffee or milk or any food for at least 1 h before or after the iron tablet

**Fe supplements alone**

**+ 29%**

**Fe supplements with concrete bioavailability education**

**- 9.4%**

*Change in number of women who were anemic at 34 vs. 16 weeks of pregnancy*

Senanayake, H. M., Premaratne, S. P., Palihawadana, T., & Wijeratne, S. (2010). Simple educational intervention will improve the efficacy of routine antenatal iron supplementation. *Journal of Obstetrics and Gynaecology Research*, *36*(3), 646-650.

# Education and Awareness: Opportunities for further study

***1. Leveraging endorsements to drive awareness***

In addition to what a message says, behavioral science suggests that who delivers the message is important to how it is received. Identifying trusted individuals (healthcare professionals, trusted celebrities, political officials) who might endorse IFA treatment may help overcome barrier beliefs about the treatment.

***2. Educating and raising awareness at trigger moments***

Behavioral science suggests that there are key moments when individuals' goals are more active than others. When identified, these moments may be a key time to raise awareness and educate on the benefits of IFA treatments.

# Treatment Design Innovations

# Beliefs About Treatment Quality/Availability Deter Treatment

Qualitative

# Belief: IFA tablets provided free by the government are lower-quality than those purchased in stores

"Educated families don't take the free tablets. They take the tablets that they buy from medicine stores."
- Medical Professional

Sedlander, E., Long, M. W., Mohanty, S., Munjral, A., Bingenheimer, J. B., Yilma, H., & Rimal, R. N. (2020). Moving beyond individual barriers and identifying multi-level strategies to reduce anemia in Odisha India. *BMC Public Health*, *20*(1), 1-16.

# Belief: “Bad” tablets should be discarded rather than taken

“They fear taking those tablets. Women in the village think that they are bad tablets so they take them and throw them away.”
- Young Woman, Not Pregnant

Sedlander, E., Long, M. W., Mohanty, S., Munjral, A., Bingenheimer, J. B., Yilma, H., & Rimal, R. N. (2020). Moving beyond individual barriers and identifying multi-level strategies to reduce anemia in Odisha India. *BMC Public Health*, *20*(1), 1-16.

Qualitative

# Structural barriers: Current system of distribution can discourage IFA adherence

- Pharmacists/medicine store-owners only sell IFA to people with prescriptions from a medical doctor.
- Village health & nutrition day workers only provide a 30-day supply, meaning women would have to return monthly to get more.
- While all pharmacies and health centers had IFA stock during this study's observation, some staff reported that they sometimes experience stock-outs.

Sedlander, E., Long, M. W., Mohanty, S., Munjral, A., Bingenheimer, J. B., Yilma, H., & Rimal, R. N. (2020). Moving beyond individual barriers and identifying multi-level strategies to reduce anemia in Odisha India. *BMC Public Health*, *20*(1), 1-16.

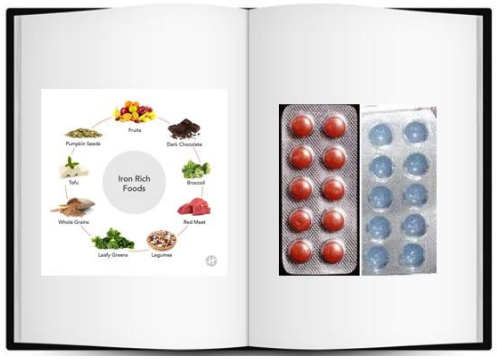
# How Program Designs Can Help Drive Adherence: Existing Research

# Key Program Design Features

### Direct Monitoring

Direct monitoring of pill uptake drives adherence, even when only first dose monitored

### Simple Communications




Simple tools such as pictorial handbooks drive adherence by communicating benefits and treatment instructions

### Alternative Treatment Vehicles

Delivering treatments via commonly consumed products helps drive adherence

Pregnant Women

Randomized control

# Directly supervised oral iron (IFA) supplementation resulted in reduced anemia levels

**Context:**

The objective of the study is to estimate the reduction in the prevalence of anemia, improvement in iron status, and to compare the compliance to oral iron supplementation during pregnancy between directly observed iron-folic acid (IFA) supplementation group and control group

**Methods**:

This was a community-based open labeled parallel block-randomized controlled trial including 400 pregnant women in a rural setting of north India.

**In the intervention group, the first dose of IFA every week was supervised by ASHA and women were instructed to take the remaining tablets during the week as per the prescription.**

In control group, IFA tablets were supplemented without direct supervision.

Ahamed, F., Yadav, K., Kant, S., Saxena, R., Bairwa, M., & Pandav, C. S. (2018). Effect of directly observed oral iron supplementation during pregnancy on iron status in a rural population in Haryana: a randomized controlled trial. Indian Journal of Public Health, 62(4), 287.

Pregnant Women

Randomized control

# Directly supervised oral iron (IFA) supplementation resulted in reduced anemia levels

**Results:**

After 100 days of IFA supplementation, the reduction in anemia in the intervention group was 6% higher as compared to control group (P = 0.219). The mean percentage compliance in the intervention group was almost 9% higher than that of control group (P = 0.001).


*Change in anemia prevalence after 100 days*

Ahamed, F., Yadav, K., Kant, S., Saxena, R., Bairwa, M., & Pandav, C. S. (2018). Effect of directly observed oral iron supplementation during pregnancy on iron status in a rural population in Haryana: a randomized controlled trial. Indian Journal of Public Health, 62(4), 287.

Pregnant Women

Controlled trial

# Using direct observers to monitor IFA tablet intake increased adherence and hemoglobin levels

**Context:**

Even though iron supplements are prescribed, the compliance to therapy is inconsistent. Since India has a predominant rural population, shortage of medical manpower and lack of healthcare facilities may contribute to poor compliance with therapy.

**Design:**

A controlled trial study was conducted with 140 pregnant women, from a rural area of Belgaum, India.

Direct observers were assigned as volunteers, who monitored consumption of oral iron supplementation tablets by pregnant women. The direct observer was a consenting adult from the same village. Detailed history and baseline investigations were done before the initiation of study and periodical assessment of hemoglobin levels were used to monitor progress. Additionally, pill count was used to monitor adherence.


Bilimale, A., Anjum, J., Sangolli, H. N., & Mallapur, M. (2010). Improving adherence to oral iron supplementation during pregnancy. *Australasian Medical Journal (Online)*, (5), 281.

Pregnant Women

Controlled trial

# Using direct observers to monitor IFA tablet intake increased adherence and hemoglobin levels

**Results**

In this study, a statistically significant difference was observed in the distribution of adherence rates among study and control groups.

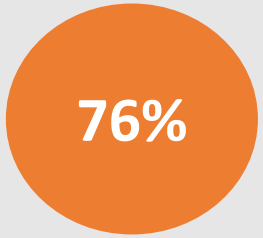
| Mean Adherence Rate | | |
|---|---|---|
| | Control | Treatment |
| 2nd visit | 49% | 78% |
| 3rd visit | 53% | 79% |
| 4th visit | 54% | 76% |

**Control group**

*(given IFA pills only)*

**Treatment group**

*(direct observer assigned to witness pill-taking)*


Bilimale, A., Anjum, J., Sangolli, H. N., & Mallapur, M. (2010). Improving adherence to oral iron supplementation during pregnancy. *Australasian Medical Journal (Online)*, (5), 281.

Pregnant Women

Quasi-experiment

# Education intervention with home visits using pictorial handbook increased IFA compliance & hemoglobin levels

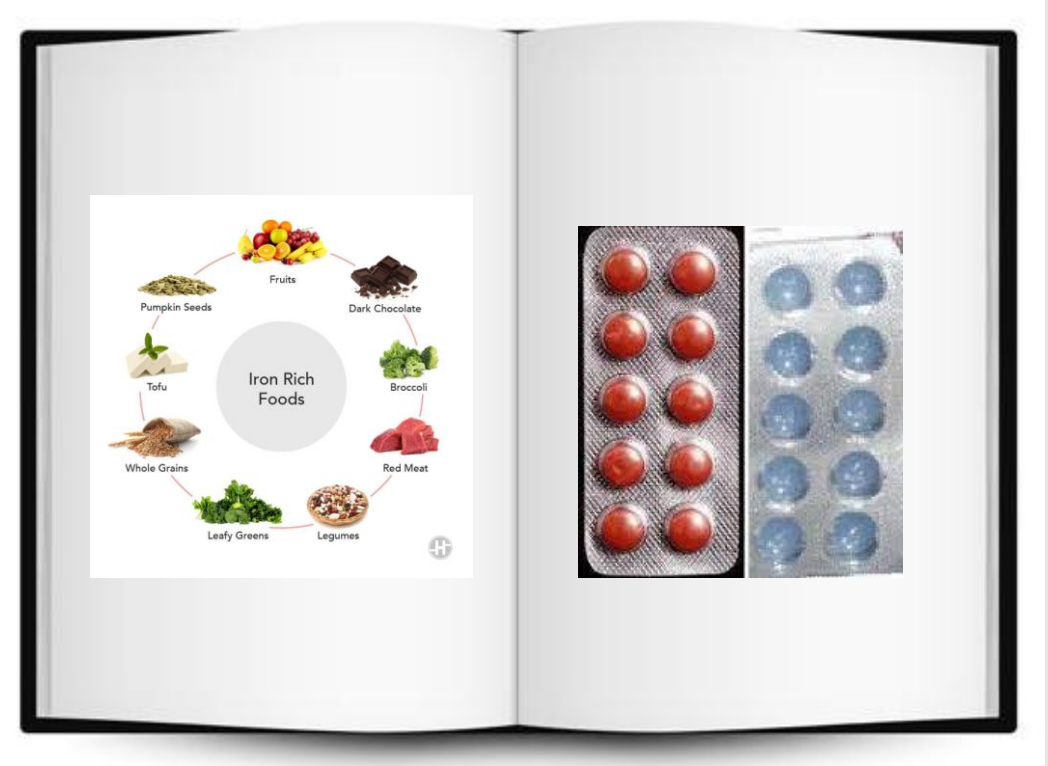
**Context:**

To determine the effect of individual education through a **pictorial handbook** on anemia in conjunction with counseling on improving hemoglobin and hematocrit level, birth weight, knowledge, iron-rich food and iron-folic acid (IFA) intake.

**Methods**:

The study developed a pictorial handbook that was conceptualized based on the Health Belief Model and adjusted to some cultural and local contexts.

The sample consists of 140 anemic pregnant women randomly allocated via lottery into two groups: **the intervention group (n=70), which received two home visits—one for education and another for a counseling session, and control group (n=70), which received routine antenatal care. Pre- and post-intervention data collection took place over a period of 15 weeks**




The information on IDA in the pictorial handbook consisted of definitions, signs and symptoms, causes and risk factors, and prevention and treatment, as well as foods rich in iron and recommendations on the intake of IFA tablets. There were pictures available to support the explanation, in addition to pictures of food rich in iron that are affordable, locally available, and recognized by the community.

Nahrisah, P., Somrongthong, R., Viriyautsahakul, N., Viwattanakulvanid, P., & Plianbangchang, S. (2020). Effect of integrated pictorial handbook education and counseling on improving anemia status, knowledge, food intake, and iron tablet compliance among anemic pregnant women in Indonesia: a quasi-experimental study. *Journal of Multidisciplinary Healthcare*, *13*, 43.

Pregnant Women

Quasi-experiment

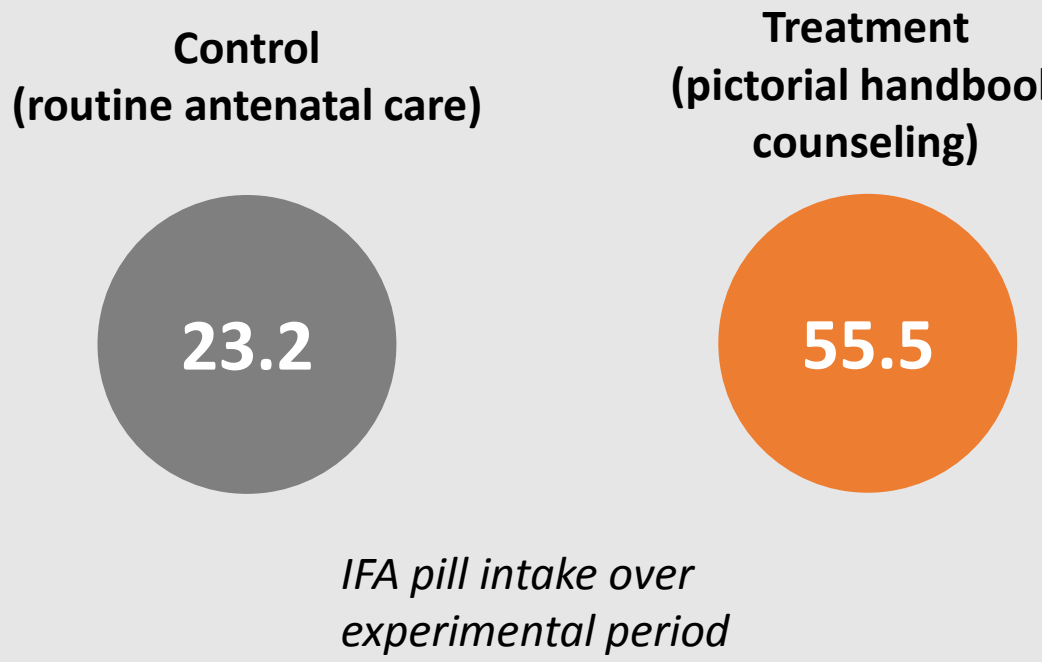
# Education intervention with home visits using pictorial handbook increased IFA compliance & hemoglobin levels

**Results:**

The post-test means of hemoglobin F (1, 132) = 122, p-value <0.001, and hematocrit levels F (1, 132) = 373, p-value <0.001, were significantly different and higher in the intervention group compared to the control group.

Similar results were found in knowledge, food frequency score, number of IFA intake (with p-value <0.001), birth weight and daily iron intake from food (with p-value <0.05).

The intervention had a particularly large effect on food frequency score and number of IFA intake, and medium effect on hemoglobin and hematocrit levels.




Nahrisah, P., Somrongthong, R., Viriyautsahakul, N., Viwattanakulvanid, P., & Plianbangchang, S. (2020). Effect of integrated pictorial handbook education and counseling on improving anemia status, knowledge, food intake, and iron tablet compliance among anemic pregnant women in Indonesia: a quasi-experimental study. *Journal of Multidisciplinary Healthcare*, *13*, 43.

Pregnant Women

Randomized Controlled trial

# Combining education with pill count approach increased iron pill adherence and anemia

**Context:**

The aim of this study is to determine the effect of an education program and / or pill count on the change in hemoglobin levels and the prevalence of anemia in pregnant women.

**Design:**

A randomized controlled trial was conducted at a hospital in Nepal. 320 pregnant women receiving prenatal care were randomized into 4 groups (control, education, pill count and education with pill count)

All recruited women received prenatal care and a daily dose of 60 mg IFA. **The education group received an education program. Pill counting was done for the pill count group at their routine prenatal visits. The education with pill count group received both the education program plus pill counting.**

Adhikari, K., Liabsuetrakul, T., & Pradhan, N. (2009). Effect of education and pill count on hemoglobin status during prenatal care in Nepalese women: A randomized controlled trial. *Journal of Obstetrics and Gynaecology Research*, *35*(3), 459-466.

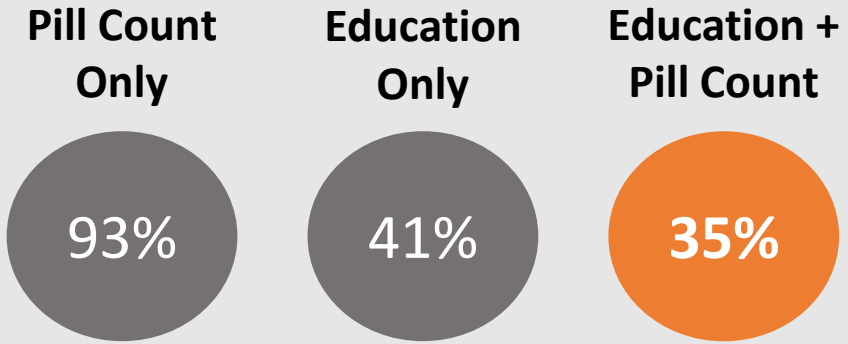
Pregnant Women

Randomized Controlled trial

# Combining education with pill count approach increased iron pill adherence and anemia

A brief counseling session to educate pregnant women on anemia and its impact on fetal & maternal outcomes increased iron pill regime adherence and lowered rates of anemia for the intervention group.

Combining this education with a routine pill counting at prenatal visits was even more impactful than education alone.




*Prevalence of anemia 3 months post intervention*

Adhikari, K., Liabsuetrakul, T., & Pradhan, N. (2009). Effect of education and pill count on hemoglobin status during prenatal care in Nepalese women: A randomized controlled trial. *Journal of Obstetrics and Gynaecology Research*, *35*(3), 459-466.

Pregnant Women

Controlled Pre/Post

# Redesigned distribution program resulted in better iron supplement compliance among pregnant Filipinas

**Context:**

To determine the effectiveness of a redesigned Fe supplementation delivery system (ISDS) in improving Hb concentrations and compliance among pregnant women.

**Design:**

A controlled before and after study design was used. A total of 1180 pregnant women across in the Philippines were given IFA tablets through standard (control) and re-designed (treatment) iron supplement delivery systems (ISDS).

The redesigned ISDS, reached by consensus based on the surveys and focus group discussions, involved the health workers in spot mapping and clustering; Fe tablets' distribution, monitoring and promotion; and counselling of pregnant women.

The redesigned ISDS was installed and implemented in the experimental villages by the trained health workers while the existing ISDS was continued in the control villages.


Risonar, M. G. D., Rayco-Solon, P., Tengco, L. W., Sarol, J. N., Paulino, L. S., & Solon, F. S. (2009). Effectiveness of a redesigned iron supplementation delivery system for pregnant women in Negros Occidental, Philippines. *Public health nutrition*, *12*(7), 932-940.

Pregnant Women

Controlled Pre/Post

# Redesigned distribution program resulted in better Fe supplement compliance among pregnant Filipinas

**Enhanced distribution system for iron supplements was affective at increasing iron supplement intake in rural Philippines.**

**Enhanced features of re-designed system included:**

- Pills distributed by health workers and traditional birth attendants
- Community mapping to assess age, sex, health, and pregnancy status
- Education materials on Fe supplementation
- Compliance monitoring via village health workers.

**Pregnant women in the <u>redesigned</u> distribution program were**

**4x**

**more likely to take iron tablets**

*Odds Ratio: 3.79*

Risonar, M. G. D., Rayco-Solon, P., Tengco, L. W., Sarol, J. N., Paulino, L. S., & Solon, F. S. (2009). Effectiveness of a redesigned iron supplementation delivery system for pregnant women in Negros Occidental, Philippines. *Public health nutrition*, *12*(7), 932-940.

Pregnant Women

Controlled Trial

# Direct monitoring of iron supplement consumption is effective at increasing adherence rates in India

**Context:**

Iron deficiency is the most prevalent nutritional deficiency on the globe. In India, pregnant women are amongst the most vulnerable population for iron deficiency anemia. Even though iron supplements are prescribed, the compliance to therapy is inconsistent. Since India has a predominant rural population, shortage of medical manpower and lack of healthcare facilities may contribute to poor compliance with therapy.

**Design:**

A controlled trial study was conducted with 140 pregnant women, from a rural area of J N Medical College, Belgaum, India. Direct observers were assigned as volunteers, who monitored consumption of oral iron supplementation tablets by pregnant women. The direct observer was a consenting adult from the same village. Detailed history and baseline investigations were done before the initiation of study and periodical assessment of hemoglobin levels were used to monitor progress.

Bilimale, A., Anjum, J., Sangolli, H. N., & Mallapur, M. (2010). Improving adherence to oral iron supplementation during pregnancy. *Australasian Medical Journal (Online)*, (5), 281.

Pregnant Women

Controlled Trial

# Direct monitoring of iron supplement consumption is effective at increasing adherence rates in India

**Direct observers (usually an older, literate neighbor or family member) were assigned to observe pregnant women take their daily iron pill.**

**Study group participants showed significantly better adherence (54% in control, 76% in intervention), avoiding major reasons for skipping doses experienced by the control group, including forgetfulness (37% in control, 29% in intervention group).**

**Control group (n=55):** Given 100 iron pills

**Study group (n=58):** given 100 iron pills and assigned a monitor to observe pill-taking

54%

76%

*Adherence rate after 100 days*

Bilimale, A., Anjum, J., Sangolli, H. N., & Mallapur, M. (2010). Improving adherence to oral iron supplementation during pregnancy. *Australasian Medical Journal (Online)*, (5), 281.

Women

Randomized Controlled Trial

# Social marketing campaign helped increase the uptake of iron-fortified soy sauce in Guizhou, China

**Context:**

As a popular condiment, soy sauce was selected as the food vehicle to improve iron deficiency through fortification. The objective of this research is to test the feasibility and effectiveness of social marketing on the improvement of women's knowledge, attitudes, and behaviors regarding iron-fortified soy sauce (FeSS).

**Design:**

A community-based intervention trial was implemented using a stratified sampling to select subjects from 2 districts (urban communities) in Kaili city and 2 villages (rural communities) in Huishui County in Guizhou Province. At district or village level, the communities were randomly divided into intervention and control groups. The participants were divided into 4 groups: experimental rural (ER), control rural (CR), experimental urban (EU), and control urban (CU) (N=113, 80, 97, 83, respectively). **A mass-media campaign to promote use of FeSS was conducted throughout Guizhou province. In the intervention areas, social marketing strategies using integrated 6 Ps (product, price, place, promotion, policy, and partnership) were implemented from December 2004 to February 2006**.

Sun, X., Guo, Y., Wang, S., & Sun, J. (2007). Social marketing improved the consumption of iron-fortified soy sauce among women in China. *Journal of Nutrition Education and Behavior*, *39*(6), 302-310.

Women

Randomized Controlled Trial

# Social marketing campaign helped increase the uptake of iron-fortified soy sauce in Guizhou, China

**An integrated social marketing strategy for promoting iron-fortified soy sauce (FeSS) was applied to reach women in impoverished rural & urban Chinese provinces. Measures included:**

- Physician-led counseling of patients on the benefits of iron-enriched soy sauce
- Community distribution of product samples & literature about FeSS

**Rural Areas**

**35** **percentage points**

**Urban Areas**

**30** **percentage points**

*Net increase in FeSS purchase at intervention sites compared to control sites.*

Sun, X., Guo, Y., Wang, S., & Sun, J. (2007). Social marketing improved the consumption of iron-fortified soy sauce among women in China. *Journal of Nutrition Education and Behavior*, *39*(6), 302-310.

# Program Design: Opportunities for further study

***1. Leveraging technology to drive adherence***

While research shows that direct monitoring helps drive IFA adherence, this tactic likely requires extensive resources, risking scalability. Additional research might explore how to replicate monitoring or similar strategies using technology such as cell phones.

***2. Integrating treatment into existing routines***

To address the belief that treatment is inconvenient or difficult to find, additional research might explore how to integrate IFA treatment into existing, established routines to drive uptake and establish IFA as a standard of care.

# Habits & Reminders

# Positive Beliefs Help Motivate IFA Treatment

# Belief: IFA supplements are like fertilizers for fetal growth & development

"If we give fertilizers to plants, then, the plants will grow. They will stay fit and fine. Similarly, tablets (IFA) are fertilizers for human beings."
- Midwife

Sedlander, E., Long, M. W., Mohanty, S., Munjral, A., Bingenheimer, J. B., Yilma, H., & Rimal, R. N. (2020). Moving beyond individual barriers and identifying multi-level strategies to reduce anemia in Odisha India. *BMC Public Health*, *20*(1), 1-16.

Qualitative

# Motivator: These tablets give my child the best chance at being smart

The doctor said that these supplements will help in the development of my child's brain. I want my child to be intelligent. Taking these supplements gives me a feeling that my child will be born healthy. I'm not aware if the medicine will benefit me.
*-33 year old w/ one child*

Chatterjee, N., & Fernandes, G. (2014). 'This is normal during pregnancy': a qualitative study of anaemia-related perceptions and practices among pregnant women in Mumbai, India. Midwifery, 30(3), e56-e63.

Qualitative

# Motivator: Taking IFA tablets means I am doing everything I can as a parent to help my child succeed

A healthy baby is my dream. This child is going to be my identity. Taking supplements regularly is the easiest thing that I can do in order to ensure that my child is born healthy.
-18 year old woman in her first pregnancy

Chatterjee, N., & Fernandes, G. (2014). 'This is normal during pregnancy': a qualitative study of anaemia-related perceptions and practices among pregnant women in Mumbai, India. Midwifery, 30(3), e56-e63.

# Establishing Habits via Reminders to Reinforce Positive Beliefs: Existing Research

Pregnant Women

Cross-sectional

# Early medical registration of pregnancy associated with better iron supplement compliance

**Context:**

Noncompliance to the iron-folic acid tablets is one of the most important challenging factors in combating anemia. Compliance is influenced by many sociodemographic factors.

The study was conducted to assess compliance to Iron folic acid supplementation in pregnancy and to study the factors affecting it.

**Design:**

The study included 239 pregnant women of gestational age 4th to 6th months from anganwadis of Surat Municipal Corporation area. Data was collected by personal interview with pre-structured questionnaire. The data was analyzed using epi info software.

*Dutta, A. J., Patel, P. B., & Bansal, R. K. (2014). Compliance to iron supplementation among pregnant women: a cross sectional study in urban slum. Natl J Community Med, 5(4), 457-62.*

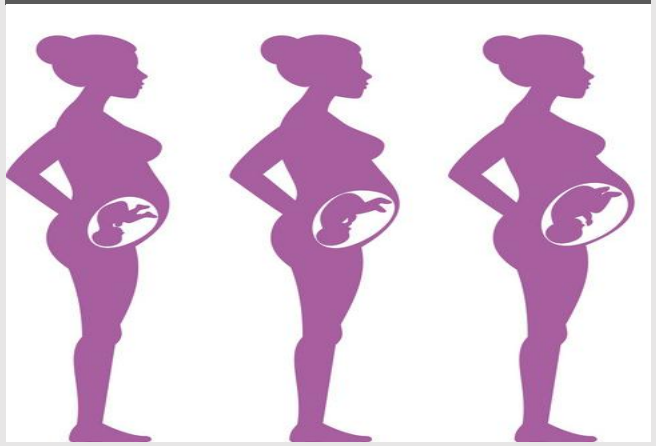
Pregnant Women

Cross-sectional

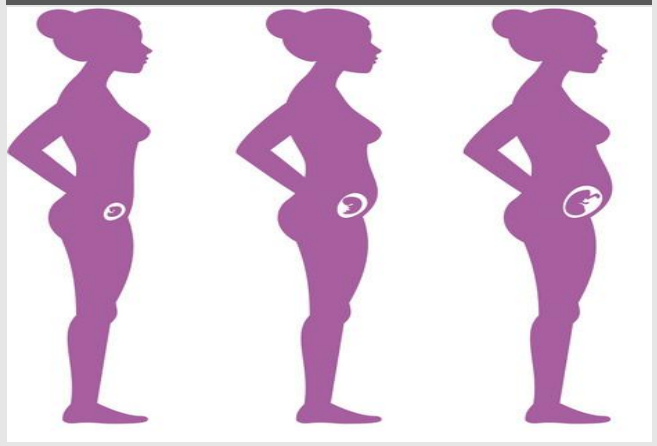
# Early medical registration of pregnancy associated with better iron supplement compliance

In a study of 239 pregnant women in Surat, it was found that those who registered with a medical facility early in their pregnancy were significantly more likely to be compliant with iron/folic acid pill regime than those who registered later in their pregnancy.

**Late Registration**
(after 3 months' gestation)



**Early Registration**
(before 3 months' gestation)



34%

*Percentage compliant with iron protocol (taking >80% of given iron pills)*

**54%**

*Dutta, A. J., Patel, P. B., & Bansal, R. K. (2014). Compliance to iron supplementation among pregnant women: a cross sectional study in urban slum. Natl J Community Med, 5(4), 457-62.*

Pregnant Women

Randomized Controlled Trial

# Designing automated voice call intervention to improve iron supplement adherence

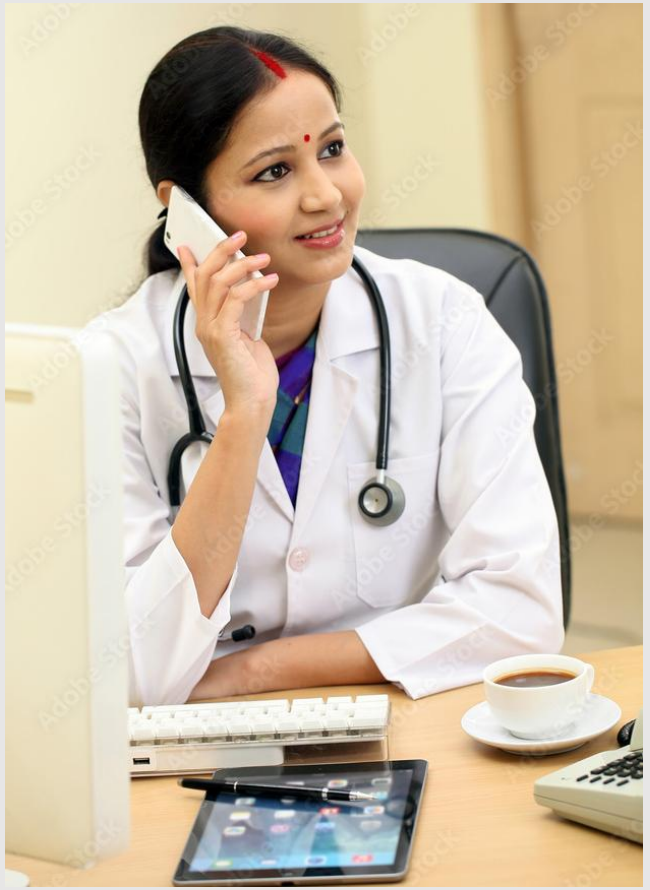
**Context:**

Researchers have long explored cell phone reminders to improve adherence to medication, but few studies have measured the direct medical benefit of those reminders.

**Design:**

Automated calls were used to promote adherence to iron supplements among 130 pregnant women in urban India. Women were randomly assigned them to control and treatment groups.

Both groups received a counseling session and a free supply of medication. The treatment group also received short audio messages, three times per week for a period of three months, encouraging them to take iron supplements.



Pai, N., Supe, P., Kore, S., Nandanwar, Y. S., Hegde, A., Cutrell, E., & Thies, W. (2013). Using automated voice calls to improve adherence to iron supplements during pregnancy: a pilot study. In *Proceedings of the Sixth International Conference on Information and Communication Technologies and Development: Full Papers-Volume 1* (pp. 153-163).

Pregnant Women

Randomized Controlled Trial

# Designing automated voice call intervention to improve iron supplement adherence

## Have personal relevance

- Voice of the doctor the woman met at enrollment
- Customized content for each phase of pregnancy
- Customized call timing based on the woman's preference

## Use positive affective appeals

- Physiological development, e.g. "your child is starting to develop a nose."
- Mutual sensing, e.g. "your child may be able to sense the sounds around you now."

## Address salient beliefs

- Specific concerns preemptively addressed by doctor in soothing tones: "you may be experiencing back ache—don't worry, take rest, and keep taking your pills as prescribed."

## Provide simple achievable action

- Simple request to continue taking pills; not asking women to undertake more drastic action or overwhelm them with too much information.

Pai, N., Supe, P., Kore, S., Nandanwar, Y. S., Hegde, A., Cutrell, E., & Thies, W. (2013, December). Using automated voice calls to improve adherence to iron supplements during pregnancy: a pilot study. In *Proceedings of the Sixth International Conference on Information and Communication Technologies and Development: Full Papers-Volume 1* (pp. 153-163).

Pregnant Women

Randomized Controlled Trial

# Automated voice calls improved iron supplement adherence during pregnancy

**Control group:**
Counseling session & free medication

**- .10 g/dL**

**Treatment group:**
3x weekly phone reminders, + counseling & free medication

**+ .32 g/dL**

*Change in hemoglobin after 8 weeks*

Pai, N., Supe, P., Kore, S., Nandanwar, Y. S., Hegde, A., Cutrell, E., & Thies, W. (2013, December). Using automated voice calls to improve adherence to iron supplements during pregnancy: a pilot study. In *Proceedings of the Sixth International Conference on Information and Communication Technologies and Development: Full Papers-Volume 1* (pp. 153-163).

Adolescent Girls

Non-controlled

# Counseling in conjunction with tablet administration reduces anemia and tablet compliance

**Context:**
Weekly iron–folic acid supplementation in small-scale research trials and as administered in institutions has been demonstrated to be effective in reducing anemia in adolescent girls.

The objective of this non-controlled study was to assess the effectiveness of weekly iron–folic acid supplementation in a large-scale project in reducing the prevalence of anemia in adolescent girls

**Methods**:

The project **provided weekly iron–folic acid tablets, family life education, and deworming tablets every 6 months to 150,700 adolescent schoolgirls and non-schoolgirls of a total district population of 3,647,834**.

Consumption of the iron–folic acid tablets was supervised for schoolgirls but not for non-schoolgirls.

Vir, S. C., Singh, N., Nigam, A. K., & Jain, R. (2008). Weekly iron and folic acid supplementation with counseling reduces anemia in adolescent girls: a large-scale effectiveness study in Uttar Pradesh, India. Food and nutrition bulletin, 29(3), 186-194.

Adolescent Girls

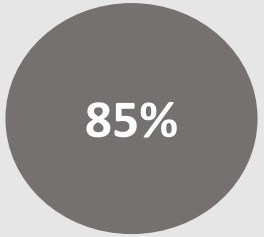
Non-controlled

# Counseling in conjunction with tablet administration reduces anemia and tablet compliance

**Results:**

Weekly iron-folic acid supplementation combined with monthly education sessions and deworming every 6 months is cost-effective in reducing the prevalence of anemia in adolescent girls. Appropriate counseling, irrespective of supervision, is critical for achieving positive outcomes.

**Iron-folic intake compliance**




**Cost of Implementation**


Vir, S. C., Singh, N., Nigam, A. K., & Jain, R. (2008). Weekly iron and folic acid supplementation with counseling reduces anemia in adolescent girls: a large-scale effectiveness study in Uttar Pradesh, India. Food and nutrition bulletin, 29(3), 186-194.

Pregnant Women

Quasi-experiment

# Active family participation and home-based reminders increased compliance of iron folate treatment

**Context:**

To examine the effectiveness of 'Trials of Improved Practices' (TIPs) on dietary and iron-folate intake during pregnancy.

**Methods**:

Quasi-experimental study design with a control group was adopted to accomplish the study objective. Four villages (Narayanpur, Rustampur, Barai and Bariyasanpur) in Chiraigaon CBD were selected for this study. The total population of each selected village varied from 3,000 to 4,000 with similar socio-demographic profile. After enumerating the eligible pregnant women (PW) (13 to 28 weeks of gestation), villages were then allocated to intervention and control groups (two villages each) by simple random sampling. Thus, Narayanpur and Rustampur were selected for the implementation of TIPs on PW and remaining two villages (Barai and Bariyasanpur) were taken as controls. TIPs were applied in the intervention group through 3 home (assessment, negotiation and evaluation) visits. Written informed consent in Hindi language was taken from all the study participants before the data collection.

Interpersonal communication, endorsing the active participation of family members and home-based reminder materials were the TIPs based strategies. The effect of TIPs was assessed by comparing key outcome variables at baseline and after 12 weeks of intervention.

TIP consists of a series of visits in which the interviewer and the participant analyze current practices, discuss what could be improved, and together reach an agreement on one or a few solutions to try over a trial period; and then assess the trial experience together at the end of the trial period

Shivalli, S., Srivastava, R. K., & Singh, G. P. (2015). Trials of improved practices (TIPs) to enhance the dietary and iron-folate intake during pregnancy-a quasi experimental study among rural pregnant women of Varanasi, India. PLoS One, 10(9), e0137735.

Pregnant Women

Quasi-experiment

# Active family participation and home-based reminders increased compliance of iron folate treatment

**Results:**

A total of 86 participants completed the study.. The prevalence of anemia reduced by half in TIPs group and increased by 2.4% in the control group. Weight gain (grams/week) was significantly ($p<0.01$) higher in TIPs group (326.9±91.8 vs. 244.6±97.4).

**Control (No TIP Implemented)**

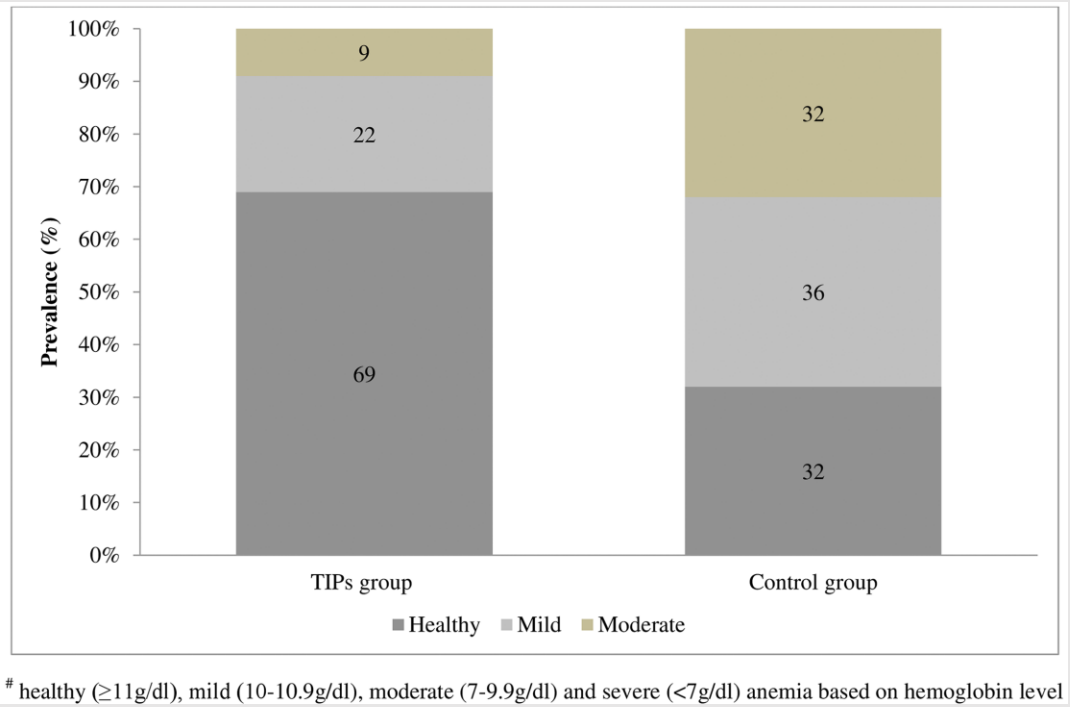
**38%**

**Treatment group (TIP Implemented)**

**85%**

*Percent pregnant women compliant for Iron-folate treatment*

**Percentage prevalence of anemia in both the study groups after the TIPs intervention**




# healthy (≥11g/dl), mild (10-10.9g/dl), moderate (7-9.9g/dl) and severe (<7g/dl) anemia based on hemoglobin level

Shivalli, S., Srivastava, R. K., & Singh, G. P. (2015). Trials of improved practices (TIPs) to enhance the dietary and iron-folate intake during pregnancy-a quasi experimental study among rural pregnant women of Varanasi, India. PLoS One, 10(9), e0137735.

Pregnant Women

Quasi-experiment

# Mobile health application for ASHAs increased IFA supplementation coverage in rural UP

**Context:**
To raise the quality of counselling by community health volunteers resulting in improved uptake of maternal, neonatal and child health services (MNCH), an m-health application was introduced under a project named 'Reducing Maternal and Newborn Deaths (ReMiND)' in district Kaushambi in India.

**Methods**:
A pre- and post-quasi-experimental design was undertaken to assess the impact of intervention.

**Intervention**: implementation of an m-health application used as a job aid by ASHAs for registering pregnant women and for providing real-time guidance through key counselling points, decision support and simple referral algorithms for various maternal and child health issues.

This mobile application provides timely alerts to ASHAs for individualized counselling of pregnant women, and serves as a tool for supervision of ASHAs' performance. The m-health platform tracks and supports clients for ASHA workers and provides individualized service and counselling 20. It replaces paper registers and flip charts with open-source software that runs on inexpensive phones.

Prinja, S., Nimesh, R., Gupta, A., Bahuguna, P., Gupta, M., & Thakur, J. S. (2017). Impact of m-health application used by community health volunteers on improving utilisation of maternal, new-born and child health care services in a rural area of Uttar Pradesh, India. Tropical Medicine & International Health, 22(7), 895-907.

Pregnant Women

Quasi-experiment

# Mobile health application for ASHAs increased IFA supplementation coverage in rural UP

**Results:**

The study found a statistically significant increase in coverage of iron–folic acid supplementation (12.6%), self-reporting of complication during pregnancy (13.1%) and after delivery (19.6%) in the intervention area.

**13%**

Increase in IFA supplementation coverage vs. control

*Prinja, S., Nimesh, R., Gupta, A., Bahuguna, P., Gupta, M., & Thakur, J. S. (2017). Impact of m-health application used by community health volunteers on improving utilisation of maternal, new-born and child health care services in a rural area of Uttar Pradesh, India. Tropical Medicine & International Health, 22(7), 895-907.*

# Habits & Reminders: Opportunities for further study

***1. Personalized reminder tools***

While technology can simplify the use of reminders through calls/texts/emails, further research might explore how to use personalization to make these tools more effective and mitigate the risk of individuals becomes desensitized to tools such as automated calls.

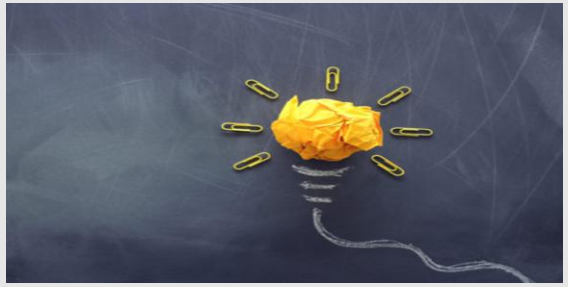
***2. Reminding key actors***

Most reminder tools focus on reminding pregnant women, but additional research might explore how reminder tools aimed at other actors such as family or community workers may also help drive adherence.

# Key learnings from intervention review

Developing a social norm around IFA treatment drives adherence

Spreading education and awareness about IFA treatments helps drive adherence



Innovations in treatment administration drive adherence

Creating habits and setting reminders help drive adherence