IDC School of Design
अभिकल्प विद्यालय

B.Des Design Project 1

# Infant and Maternal Nutrition

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Under the guidance of
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# Declaration

I declare that this written document represents my ideas in my own words and where others' ideas or words have been included, I have adequately cited and referenced the original sources. I also declare that I have adhered to all principles of academic honesty and integrity and have not misrepresented or fabricated or falsified any idea/data/fact/ source in my submission. I understand that any violation of the above will be cause for disciplinary action by the Institute and can also evoke penal action from the sources which have thus not been properly cited or from whom proper permission has not been taken when needed.

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# Approval

The B.Des Design Project titled “Infant and Maternal Nutrition” by Niharika Mohile, Roll Number 18U130021 is approved, in partial fulfillment of the Bachelor in Design Degree at the IDC School of Design, Indian Institute of Technology Bombay.

Project Guide

Chairperson

External Examiner

Internal Examiner

# Acknowledgements

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I would also like to thank Dr Goda for helping me with primary research and being so welcoming. I also acknowledge that this project would not have been possible without the ASHA workers and mothers I met in Palghar who all helped so much with primary research, my own mother for the constant motivation, and my friends, for always being there when I was stuck.

# Abstract

This report talks about the work I did over the autumn semester of 2021. It starts with an introduction to the topic of Infant and Maternal Nutrition, especially the problems in the area. It then shows my approach to the problems. We read about both primary and secondary data collection, through doctors and other professionals in the field, as well as collection of data of existing solutions. I then talk about my idea for a service design solution, and then change course to a smaller solution that deals with videos made by CTARA, a body under IIT Bombay. FInally, I also present some posters I made for the project.

# Contents

# Motivation

Growing up, I spent a lot of Saturdays in my mother's office. She is a paediatrician in a government hospital in New Delhi. I often saw women coming in, describing issues with their babies, and my mother and the other doctors there scolding them for their lack of awareness in dealing with things like vaccination, breastfeeding and so on. What I realised over time, was that the lack of awareness was a systemic issue, and needed to be dealt with as such. For this reason, I wanted to work with young women and children for this project.

# Goal

Before my very first presentation, Prof. Bokil told me to decide on what my short term and long term goals are. I had decided that my long term goal would be to understand what the deep-rooted issues are, preventing good reproductive health, and to also try to understand how these can be solved. As a shorter term goal, I wanted to design an implementable intervention that would be able to improve the reproductive health of Indian society, even if it has a small impact.

# Introduction

## *Context*

I started my P1 with the idea that I want to work on reproductive health for Indian society, and began with secondary research for the same. Over time, I narrowed my target demographic down to Infants and Young Women, and then the topic narrowed further down to Infant and Maternal Nutrition.

Fortunately for me, I was able to find Dr Rupal Dalal, a professor in the Centre for Technological Alternatives for Rural Areas (CTARA), who works in the same field. She gave me a lot of guidance and resources that helped me carry my project forward. During the course of my project, she was working in the Palghar region, so I too, decided to narrow my focus to that region, especially after my jury suggested it.

The field of Infant and Maternal Nutrition can be broadly classified into 3 sub-fields, based on my secondary research. These include maternal nutrition (pre and post pregnancy), breastfeeding, and complementary feeding (food that is given to babies after 6 months of age).

One of the resources CTARA has developed for improving Infant and Maternal Nutrition is their set of Health Spoken Tutorials - a series of videos that deal with a diverse range of topics under Infant and Maternal Nutrition. This is what my final solution deals with.

## *Objective*

After talking with my guide and Dr Dalal, I decided that purpose of my project would be to create an intervention that aids in better health for the infants and mothers for the Palghar region, by working on their nutrition. Following were the points I kept in mind:

- The solution had to be **implementable,** and have real-world value, rather than being a simply hypothetical exercise

- The solution must be **localised** to the region of Palghar, but should also be **able to get upscaled** to reach a more diverse audience

- The solution must be **accessible** irrespective of class or income, so that it is of use to even those who come from less privileged backgrounds

## *Scope*

The scope of the project was defined as follows:

- Understanding the problems in the broad field of Infant and Maternal Nutrition
- Conducting first-hand research in a local context
- Identifying areas that can be worked on
- Ideating for implementable solutions
- Discussing with field experts the viability of possible solutions
- Deciding on a final solution and implementing it
- Identifying scope for further work

# Narrowing Down to Topic

I started working with the broad topic of Sexual and Reproductive Health for Indian Adults. I did quite a bit of secondary research in this field, encompassing diverse populations, like men [8], and adolescents [1] in slums, married couples [4], transgender folks [3], women migrants [5], alcoholics [7] etc. After my initial research, I met with Prof. Bokil, who told me that I needed to narrow down to a specific population.

I was not sure of who I wanted to pick and subsequently work with. Prof. Bokil talked extensively with me, and helped me na rrow down to the populations of Infants and Young Mothers, seeing as that is what I was passionate about.

I then did primary and secondary research within this topic. I talked to two doctors: Dr Mukula Mohile - my mother (a paediatrician), and Dr Mamta Pandey (a gynaecologist). They helped me identify the different problems they've seen young mothers face, problems related to early marriages, lack of family planning, nutritional issues in pregnancy, gender issues, medical care during pregnancies, Issues like PPH, anaemia, high blood pressure, delivery complications, improper breastfeeding, superstitions which hold us back, vaccination-related issues, and improper complementary feeding. Of these, multiple topics came under the umbrella of nutritional issues. Therefore, I decided to narrow down my focus to Infant and Maternal Nutrition.

# Final Design Brief

To create a design intervention, one that enables better Infant and Maternal Nutrition in the rural area of Palghar. This would be created while working alongside CTARA, and would finally be implemented through CTARA to reach a wide audience.

# Data Collection

## *Secondary Research*

When starting my work, my first step was to do secondary research, mainly to find out that which has already been done within this field.

I started with government reports on Infant Mortality, Maternal Mortality, and what the reasons for this are. I also looked at existing government schemes that work in this area, and are working to improve Infant and Maternal Health. I found a number of programs:

The Pradhan Mantri Surakshit Matritva Abhiyan (PMSMA) launched by MoHFW, provides a fixed day for assured, comprehensive and quality antenatal care free of cost to pregnant women on the 9th of every month. This Programme strengthens antenatal care detection and follow up of high-risk pregnancies, contribute towards the reduction of maternal deaths and reduce the MMR of India.

Janani Shishu Suraksha Karyakaram (JSSK), a scheme that encompasses free maternity services for women and children, a nationwide scale-up of emergency referral systems and maternal death audits, and improvements in the governance and management of health services at all levels.

“Prevention of Post-Partum Hemorrhage (PPH) through Community-based advance distribution of Misoprostol” by ASHAs/ANMs, launched for high home delivery districts. Operational Guidelines and Reference Manual have been disseminated to the States. However, guidelines on the above are explicit in saying that during the counselling sessions with the pregnant women conducted by ASHAs and ANMs, emphasis is laid on the need to register for ANC and delivery at institutions.

While most of these seemed to work for overall health, several of them had clauses that specifically addressed nutritional issues. Janani Suraksha Yojana and Janani Shishu Suraksha Karyakram, for instance, offer nutritional services to those that visit primary healthcare facilities. Their impact, however, remains limited due to poor governance, shortage of health workers in primary health-care facilities and lack of preparedness of health-care facilities [2].

One of the more successful initiatives taken by the government of India is Infant and Young Child Feeding, or IYCF. It is a policy for the training of ASHAs, ANMs, etc. on proper breastfeeding and complementary feeding. This information is then disseminated and comes of benefit to all young mothers.

UNICEF has also put efforts in this area, but they have been not-so-effective. UNICEF recommends powdered nutrients to be fed in case of malnutrition, but these come with so many problems of

their own. The powders they recommend are called Ready-to-Use Therapeutic Food packets, or RUTF. There is one major issue with these powders. They are unpalatable. One doctor, on condition of anonymity, expressed her frustration with UNICEF's method. "The mothers end up feeding this mixture to their hens. The hens too refuse to eat it." [6]

Other issues with the RUTFs include that they are too expensive, compared to giving fresh food. According to Indian doctors, the best way to handle malnutrition is to have a balanced diet with locally grown foods [6].

I also collected samples of existing posters and brochures that are distributed or pasted in government hospitals. These gave me an idea of the existing method of communication, the visual style being used, and the kind of data being imparted. While some of the posters were made by renown organisations, others were made by the hospital staff themselves. I collected a small database of such posters and brochures to reference to when designing my own.

# *Primary Research*

After completing secondary research and gaining a background within the field, I started my primary research. For this, I visited the Dhavale Trust Hospital in Vikramgadh, Palghar. It was a single-day trip, during which I talked to Dr Goda, Dr Dalal, ASHA workers and local mothers.

## Dr Goda

Dr Goda runs the Dhavale Trust Hospital with her husband. On the ride to the hospital, from Thane to Palghar, Dr Goda told me in earnest about their work in the hospital.

They have been working in the area for over a decade now. It is a not-for-profit, which gets funds from donations. She talked to me especially about their workin the Infant and Maternal sector, as that is what I was interested in. She talked about how over the years that they have been working, they had managed to reduce both infant and maternal mortality rates. They had successfully raised the average weight of babies at birth, converted most home deliveries to hospital deliveries and reduced child wasting (a condition in which the child is too thin for their height). She also told me about the issues in the community that hold them back from better health. One, for example, was that the society in these villages did not feed pregnant women special, nutritious food. Rather, they would give them dal water or rice water, and not allow them to eat non-veg, etc. This led to poor foetal and maternal health. Another issue was late and improper complementary feeding.

Their successes, Dr Goda contributed to the counselling they provided to the locals. She stressed on educating them about better ways, and talked about her hospital being an essential support system. On the day I had gone there, Dr Goda had organised a talk on breastfeeding for the ASHAs of the nearby regions, conducted by Dr Dalal.

## Prof. Rupal Dalal

Prof. Dalal works at CTARA, and is a doctor by education. At CTARA, she has been working on Infant and Maternal Nutrition for a while already, and she has been most helpful to me since the beginning of this project.

When starting, she sent me a link to the English playlist for the Health Spoken Tutorials. This is a series of about 70 videos developed by CTARA, which talk about breastfeeding and other important topics that come under Infant and Maternal Nutrition. She told me to watch these, to gain a background. These videos developed by her ended up being the final focus of my project.

During the Palghar visit, I attended Dr Dalal's talk on breastfeeding and nutrition. During the first session, she played the video for the cross-cradle hold to the 30 assembled ASHA workers. She explained the hold, and then tested them on it. To my surprise, in spite of having watched the video and discussed it, the mothers were not able to do it properly. It was only after Dr Dalal personally showed them how to do it, where to place the bay, where to place their hands, etc., did they understand and manage to do it properly. This made it clear that the videos themselves weren't enough.

Further on, in the second part of her session, she talked about different nutrient food groups, stressing on the importance of including all of them in the diet. For each food group, she had cards she showed the mothers, to get them to recognise the food items. The exercise intended to teach the local mothers what food items come under which food groups, as well as what nutrients they provide. What it also did was gauge which nutrients are easily available to the villages through affordable, locally found foods, and which nutrients cannot be accessed by them. Earlier, Prof Bokil had told me to not assume that the issue is lack of awareness, as it could also be inability to find locally, or inability to afford different foods. But through this exercise, we saw that all the food groups were available in some form or the other.

### The ASHA Workers and Mothers

During and after the sessions, I also interacted with the ASHA workers and the mothers. Most of them spoke a local dialect of marathi that I did not understand, and often did not or would not speak hindi. From the conversations that were successful, I garnered the following information. The primary source of knowledge for these women, were older women within the family like their mothers-in-law, or the ASHA workers or ANM midwives who helped them through the pregnancy. Men were not involved, and neither did they read books, magazines, or watch shows or videos about these.

Of the women there, almost all had smartphones, while a select few had feature phones. Everyone who had a smartphone knew how to use Youtube, although typing in English seemed to be an issue for several of them.

All the women were eager to learn what Dr Dalal was teaching, eager not only for themselves and their children, but also to use this information as the ASHAs of their own villages.

# Initial Ideation- Identification of a Large Scope

As I returned from the field study, I ideated with Dr Dalal, on the potential outcomes. I described to her my idea of a full-fledged service design project - one that would tackle the nutrition problem from the roots, using facilitators like her in a tiered system. This is what I presented in my Phase 3 presentation. This service would make use of the existing infrastructure, including the anganwadis, the ASHA workers, Dr Goda's hospital, and the information in the Health Spoken Tutorials.

However, when I pitched this idea to my guide, he explained that though this was appropriate identification of a large scope, it was not within the scope of my project. He explained that a project of that magnitude would need much more time than I had left, and possibly more people as well. Instead, he told me to pick a smaller problem within what I had researched, and work on that.

# Narrowing Scope Down

After my discussion with Prof Bokil, I attempted to find a more doable, smaller problem to tackle. I started by identifying the different problems that are currently affecting the health of the mothers and children.

I created a mind map, as shown to the right. The text in purple identified some of the different interventions that are needed. In yellow, were the existing solutions, which were being ineffective. I decided that for my P1, I would pick one of the existing solutions, and try to improve upon it.

When at Palghar, I had seen the videos be ineffective - the ASHA workers had already been told to watch all the videos, yet they had either not watched them, or not understood them. Clearly, something was the matter here. At Prof Bokil's suggestion, I chose to work with the Health Spoken Tutorial videos.

Further, I realised that though these women knew about the videos through Dr. Dalal and Dr. Goda, for most Indian society, this was not the case. Not everyone knew about these videos, and further, not everyone would have access to smartphones and the internet. For this, I decided to make posters, which would convey the same information as the videos, but in a format the women can actually use. These posters would be pasted on the walls of their local anganwadi, or nearby hospitals.

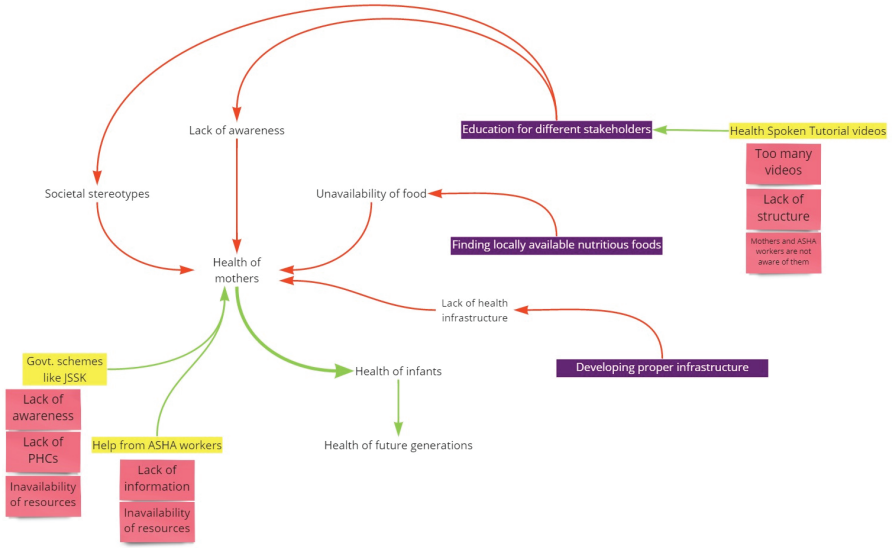



*Fig 1. Problems and interventions, Infant and Maternal Health*

# Final Solution

I started by analysing the strengths and weaknesses of the videos:


*Fig 2. Strengths and weaknesses of CTARA's Health Spoken Tutorials*

The videos certainly had a lot of benefits. They covered important information, which was provided by actual doctors. The videos were localized to the Indian context, as is evident by the examples they took; they are also available in a number of local languages. The videos are individual, not in an order. Therefore, one can easily watch the video that is relevant to them without having to watch the previous videos. Finally, the videos are entirely free, and also very easy to access - they are right there on YouTube, for everyone to watch and learn from.

At the same time, the videos also came with their own drawbacks. Firstly, there are 70 videos upfront, with no grouping or chunking. This is a bit overwhelming to see at first. There is also no hierarchy to the videos, no structure. It is hard to discern where one should start from. Moreover, there are certain bits of information that are repeated again and again through a dozen videos of the same type. While the repetition surely helps in increasing retention, it can also get annoying or frustrating, especially if the videos are watched continuously. There are also so many datapoints given in each video, remembering everything can be hard. Finally, as mentioned above, the ASHA workers had watched the videos, yet were unable to perform the different breastfeeding holds. This means that despite watching the videos, it is hard to practically implement the knowledge you have gained.

Addressing these issues, I came up with possible solutions, which are detailed in the further pages.

# *Structuring Videos into Playlists*

One of the major problems with the existing videos was the sheer number of videos, and the unorganised fashion in which they currently are. When one opens the Health Spoken Tutorials, it is easy to be daunted by simply the number of videos, with no knowledge of where to start or end, or what to watch in what order. To organise the videos, my first solution was to divide them into playlists by theme.

For this, I conducted a Card Sorting task with five 20-30 year old females. Based on the task, I created categories, and sorted the 70 videos down into 9 groups.

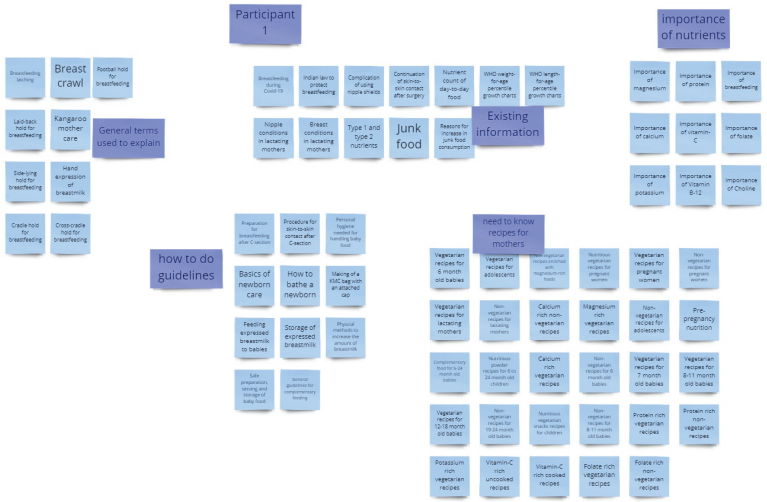



*Fig 3a. Card sorting example 1*

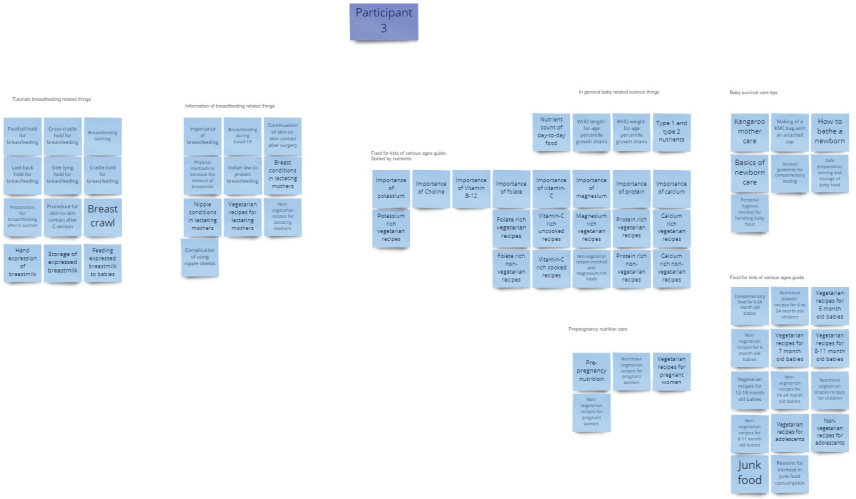



*Fig 3b. Card sorting example 2*

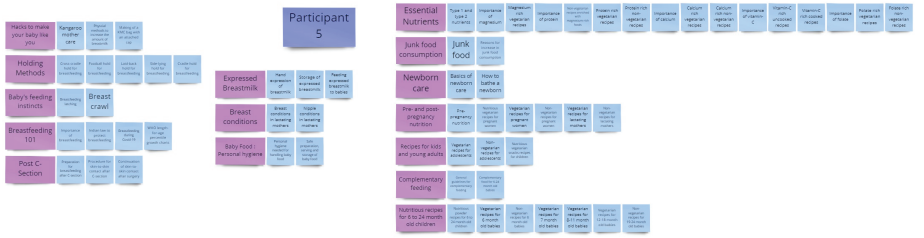



*Fig 3c. Card sorting example 3*

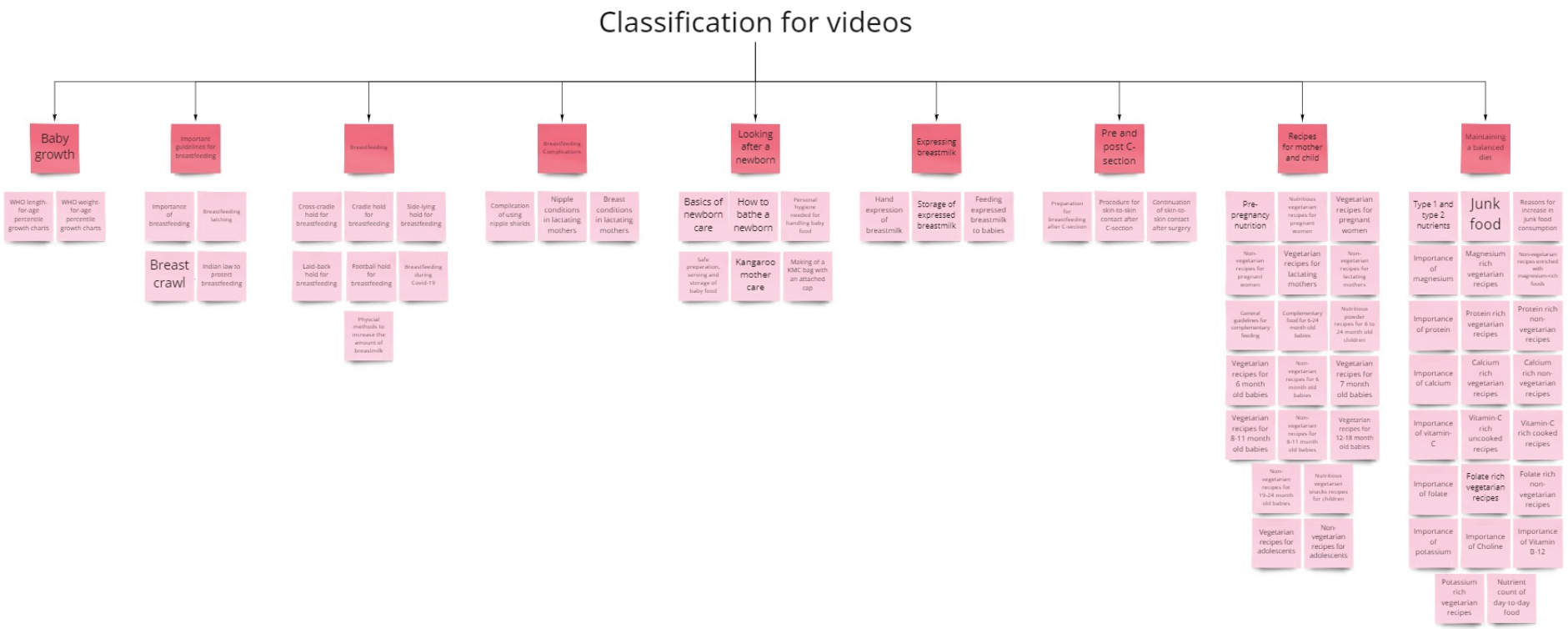



*Fig 4. Final classification of videos*

# *Subscribing to a Video-Delivery System*

The second potential solution was a video-delivery system for the expecting mothers. In this system, mothers at any stage of pregnancy could sign up for the tutorials. They would then receive via sms links at certain stages of pregnancy, for videos that they should watch at that time period. In this solution, videos were classified not by theme, but by time period of when they should be watched.

For mothers that sign up late, say at the second trimester, the earlier links (Before pregnancy and First Trimester) would be sent first, and then the links would continue on being sent in the timely fashion.

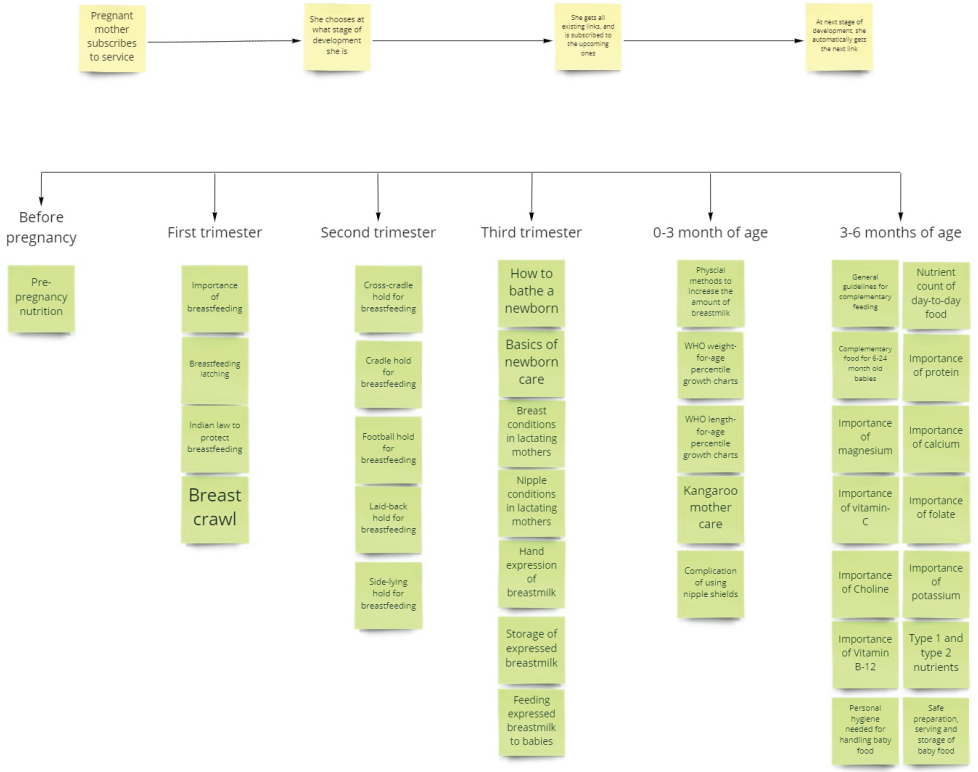



*Fig 5. Chronological division of videos for video-delivery system*

## *Quizzes for Increased Retention*

A proposal I had for increasing information retention after watching the videos was to put in quizzes during and after the videos. These 'quizzes' would be questions based on already shown video content, and would be read aloud in the video. There would then be a 10s pause where the mother thinks about the answer, before the correct answer is revealed. These sort of quizzes would reinforce the information shown in the minds of the viewer, thereby increasing retention.

**दिए गए वाक्यों में से, क्रॉस-क्रैडल होल्ड के बारे में कौन सा गलत है?**

क) माँ फर्श पर पालती लगाकर बैठ सकती है

ख) माँ को अपने कंधे ऊपर उठाने चाहिए

ग) माँ को बच्चे के सिर को उस हाथ से पकड़ना चाहिए जो उस स्तन के विपरीत हो जिससे वह दूध पिलाएगी

घ) माँ को बच्चे को अपने स्तन तक उठाना चाहिए, बच्चे की ओर झुकना नहीं चाहिए

*Fig 6. Example of quiz shown during video*

## *Master Videos to Decrease Time Load*

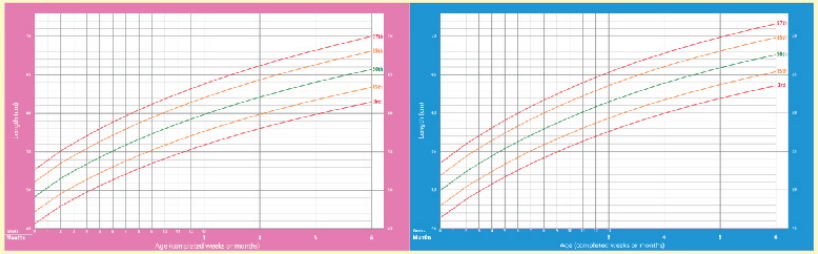
My final solution was one that reduced repetition, and the time spent in watching the videos. Currently, there is a lot of repetition between similar videos. For example, there are 5 videos on different breastfeeding holds. While the time spent on actually describing the new hold is very less, a lot of time is spent on giving the same information in each video - information like why breastfeeding is important, different latching styles, positioning of hands with respect to baby's mouth, etc. All this information can be put into one master video, which would function as a prequel to the rest of the 5 videos. Having to watch that information only once would reduce frustration and save time.

## *Posters*

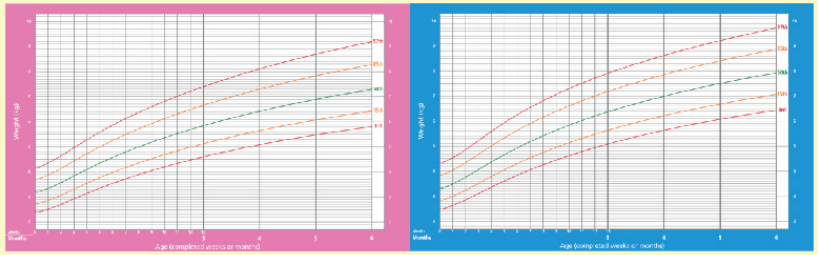
I also worked on a solution unrelated to the videos. This included posters which disseminate the same knowledge as the videos, but as a static visual. These posters are meant to be A3 sized, pasted within the hospitals or anganwadis, for the village women to see and read. The posters would ideally be in the local language, though the ones I have shown as examples are in English. Along with the posters, brochures can also be distributed to expecting mothers, on a variety of topics. The mothers can go through these brochures in their own time and learn what they are trying to teach.

# Feeding Your Baby

Following are the Growth Standards recommended by the World Health Oragnisation. The graphs show length-for-age and weight-for-age according to different percentiles.



WHO length-for-age charts for girls and boys



WHO weight-for-age charts for girls and boys

## Upto 6 months

**Only breastmilk** should be given to babies upto the age of 6 months

Breastmilk should be given whenever the baby wants it. The frequency is generally every 2-3 hours.

No water, ghutti, tea or honey should be given to the baby at this age

No animal milk should be given at this age. Baby bottles are harmful to your child's health.

Breastmilk contains all the nutrients a baby needs for the first 6 months of life.

## 6-9 months

At 6 months of age, baby must be started on food other than breastmilk.

At first, the consistency of this food should be liquid, and slowly this should be brought up to semi-solid.

Examples of food could be mashed banana, porridge, etc.

The frequency of feeding of complementary food should start at once a day, and by the ninth month it should reach upto 3-4 times a month.

Breastmilk should be continued throughout.

## 9-12 months

By 9 months of age, the baby should be eating 3-4 bowls of food a day, and this should be slowly increased to 5-6 bowls a day, by the end of 12 months.

The consistency of food should become thicker during this time period, till a quite thick consistency. By 12 motnhs of age, baby should also start eating rice and chapati.

By 12 months of age, the baby should ideally be eating half of the quantity of food that his mother eats.

Breastmilk must be continued till 2 years

# Breast Crawl

Immediately after birth, the baby should be placed on the mother's abdomen. From here, it makes its way to her breasts by crawling forwards, and starts suckling on the breasts. This process is called the breast crawl, and is mandated by the Government of India, to be done for every live birth within 60 minutes of delivery.

## The breast crawl works on the baby's instinctive feeding behaviour

**Checklist for correct placement of baby for breast crawl:**

1. Tummy to tummy contact between mother and child
2. Head of the child should be between the mother's breasts
3. Mouth of the baby should be below the breast

**Remember, be patient :)**

## After delivery, skin-to-skin contact is the most important!

**Benefits of Breast Crawl:**

1. Breast crawl results in the baby drinking colostrum, the most important food for a newborn. Colostrum functions as the baby's first vaccine, and contains everything the baby needs for intial growth
2. The skin-to-skin contact with mother keeps the baby warm, and gives it a sense of love and security
3. Healthy bacteria from the mother's body are given to the baby, for a strong gut
4. The initial breastmilk boosts the baby's immunity
5. The crawling action of the baby pushes on the mother's tummy, which helps shed placenta
6. Breastfeeding also increases oxytocin, which further helps shed placenta.
7. It also prevents bleeding, thereby decreasing the chnaces of the mother developing anaemia
8. It helps the baby pass its first stool

**Talk to your surgeon and nurses beforehand, and ensure they help your baby perform the very necessary breast crawl immediately after birth**

# Say NO to Bottle-Feeding!

### Why is exclusive breastfeeding important?

1. Breastmilk has exactly all the nutrients needed for the development of the baby's body and mind. It has the right amino acids, antibodies, and so much more.

2. Breastmilk is the most hygienic, as it has touched no contaminated surfaces. Thus, breastfeeding your baby prevents contracting infections.

3. The act of breastfeeding is of utmost importance for mother-and-child bonding.

### But why is bottle-feeding bad?

Baby bottles, and especially their nipples, are notoriously hard to clean, and can sometimes carry infection despite the best sterilization methods. This increases the chances of babies contracting diseases like Diarrhoea, which could be possibly fatal.

Further, in developing countries, with lack of access to clean running water, bottle-feeding your baby through unhygienic bottles is a death wish.

Moreover, 'upar ka doodh' or animal milk is not optimum for feeding babies. Cow milk is optimum for calves, not for human babies - it contains too much of protein for the human baby to digest easily. Diluting this cow milk and feeding it to the baby solves the problem of too much protein, but causes further problems of inadequate nutrition. Therefore, the best milk for a human baby is the mother's milk itself, and none other.


It is possible to feed the baby expressed breastmilk, but **avoiding the bottle is still a must.**

To express breastmilk, the mother must squeeze out both foremilk and hindmilk from both the breasts, into a clean vessel. This milk should be protected from contamination at all costs.

The expressed breastmilk can then be fed to the baby using a small bowl and spoon, instead of the bottle.

The feeder must take care that the bowl and spoon, as well as their own hands are clean, and will not cause infection.

# Conclusion

The field of Infant and Maternal Nutrition is broad and has great scope for improvement. In this project, I was able only to suggest minor changes to existing infrastructure that helps improve infant and maternal nutrition. Of the four possible solutions I suggested, while two are viable (the structuring of videos into playlists and the video-delivery system) and will soon be implemented, the remaining two (quizzes and master videos) were evaluated and found to not be possible in the current scenario.

# Future Steps

This field has a large scope for improvement, as mentioned earlier. Future steps that I am planning on taking include:

- Conducting further on-ground research as well as research with professionals in the field to better understand the situation

- Work with CTARA to design a service/system solution that would be holistic and rooted in research, one that could help better the infant and maternal nutrition in the area of Palghar

- Translate the localised solution into a scalable one so as to help improve the infant and maternal health of a much wider region

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