

Part. 2

The Future of Food

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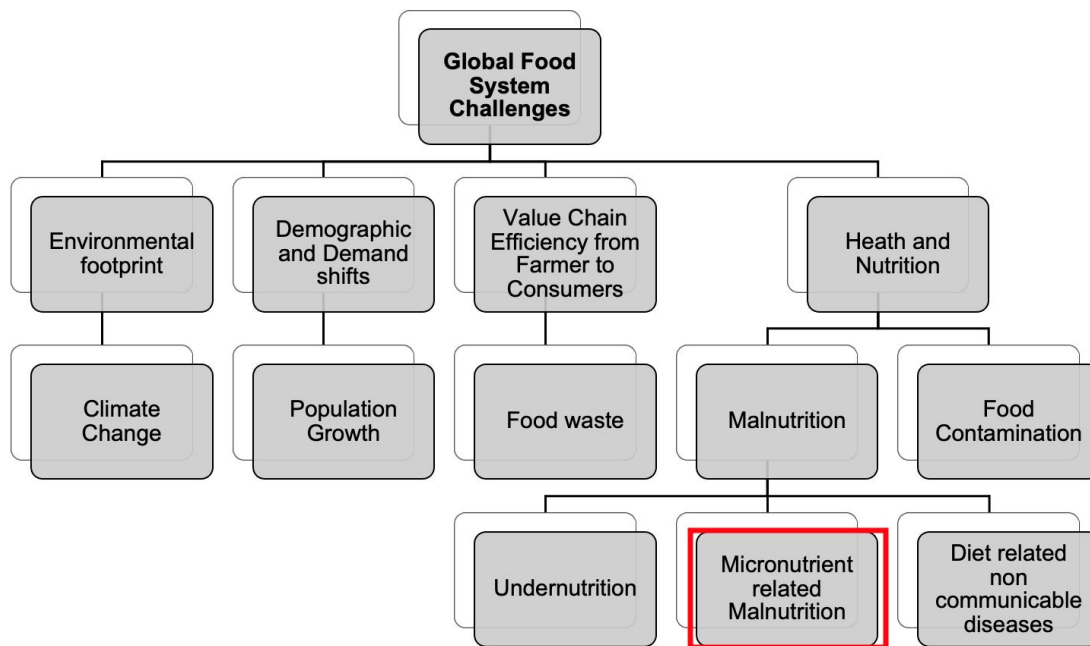
Table of contents:

MICRONUTRIENT RELATED MALNUTRITION IN PREGNANT WOMEN IN THE USA	3
1.1 The problem	3
1.1.1 Micronutrient-related Malnutrition	3
1.1.2 Target customer: Pregnant women	4
1.1.3 Reasons behind Micronutrient deficiency in PW	6
1.2 Why does it concern Walmart US?	6
1.2.1 Walmart	6
1.2.2 Fight against Malnutrition at Walmart	7
TRANSFORMATIVE INNOVATIONS	8
2.1 Transformative innovations	8
2.2 Micronutrient deficiency in PW	8
2.2.1 Big Data and Advanced Analytics technology	10
How does our product work?	10
3.1. Interactive prototype screenshots and service blueprint	10
4. Impact	15
5. Implementing the App in Walmart	15
5.1 Key Resources	15
5.2 Costs - please smartart for this	16
5.3 Potential Implementation Issues	16
5.4 Why is Walmart an appropriate place to develop this idea?	16
6. Design Thinking Process	17
7. Appendix	20
7.1. Micronutrients	20
7.2 Quid Search	24
7.3 Transformative innovations	25
7.3.1 Food sensing technology	25
7.3.2 Food fortification technology	25
7.4 Interviews	25
7.5 Feedback	27
Bibliography	28

1.MICRONUTRIENT RELATED MALNUTRITION IN PREGNANT WOMEN IN THE USA

1.1 The problem

Problem statement: A large portion of pregnant women (PW) in the USA do not consume sufficient micronutrients required for pregnancy due to appetite changes that consequently makes it harder for them to follow healthy diets. This can be explained as many nutrient needs increase during the pregnancy such as iron, calcium, zinc, vitamin C, and D.



1.1.1 Micronutrient-related Malnutrition

Micronutrient-related malnutrition refers to diseases caused by a dietary deficiency of vitamins or minerals. Despite a large body of evidence supporting the importance of adequate nutrition in pregnancy:

- around **20% to 30%** of pregnant women worldwide suffer from some **vitamin deficiency** and;
- around **16%** of US pregnant women have **iron deficiency**.(1)

Therefore, much attention has been given to micronutrients to minimise pregnancy complications such as anaemia and hypertension.

1.1.2 Target customer: Pregnant women

Having a nutritious diet is vital for everyone, but especially for pregnant women due to several reasons:

First, around 200 kcal more energy is required daily during pregnancy due to the “metabolic demands of the fetus” (2), thus more micronutrient intake is recommended. For example, 70µg more iodine is required during pregnancy. (3)

However, following in-depth interviews, we noticed that not many women are aware of the increased need in micronutrients.

Second, certain micronutrients are crucial for fetus' development. For example, folate is important for the fetus' cell division and tissue growth, and vitamin D is required for the fetus' bone development. (4)

Moreover, lacking certain micronutrients affects the mother and the fetus in a negative way. For example, lacking iron could lead to preterm labour or low weight births. (4)

Keeping the recommended daily allowance is thus extremely important as exceeding it could also damage the fetus.

Taking too much iron on the other hand could lead to miscarriage and preeclampsia. (5)

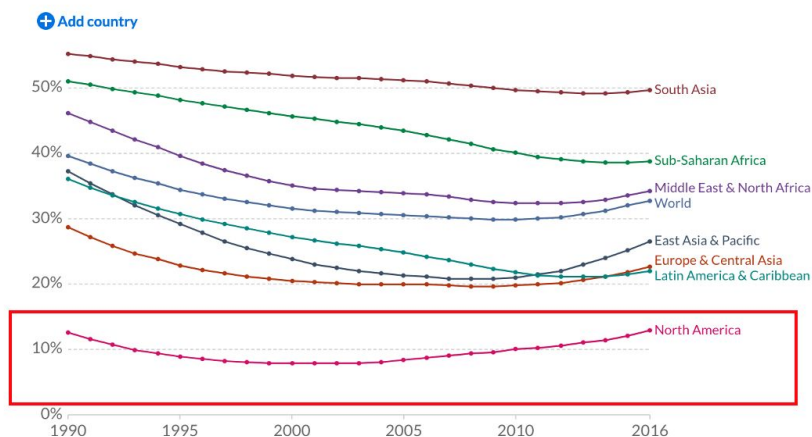
Lastly, there are signs of the need to address this problem in pregnant women in the USA. The USA pregnant women are not taking enough iodine according to the Iodine Global Network (IGN). (6) In addition, 30 % of pregnant women in the USA seem to not take enough vitamin D. (7)

The anemia, a disease caused due to the lack of iron and folate, has kept increasing constantly since 2002, from 11.68% to 16.16% in 2016. (8)

This increase is shown in the graph below:

Prevalence of anemia in women of reproductive age, 1990 to 2016
Prevalence of anemia in women of reproductive age (aged 15-49), measured as the percentage of women with a hemoglobin level less than 110 grams per liter at sea level.

Our World
in Data



Source: World Bank

OurWorldInData.org/micronutrient-deficiency/ • CC BY

(9)

The table below illustrates what has been discussed above in detail:

Micronutrient	USA Recommended Daily Allowance (RDA)	Relevant Micronutrient deficiency disease	The importance of following the intake recommendation during pregnancy	Food rich in Micronutrient
Iodine	pregnant women: 220µg Non-pregnant women: 150µg (10)	Iodine deficiency disorders	-lacking iodine could cause a baby being born with low IQ, congenital hypothyroidism in fetus, goitre in both mother and fetus, miscarriage and early infant death (4) -too much iodine intake could cause a baby being born with congenital hypothyroidism (11)	kombu kelp: 2,984mcg per gram wakame: 66mcg per gram cod: 3 ounces 63-99mcg cheddar cheese: 65mcg per ounce shrimp: 35mcg per ounce (12)
Iron	pregnant women: 27mg Non-pregnant women: 18mg (10)	Anaemia: keep increasing constantly in the USA pregnant women since 2002 from 11.68% 16.16% in 2016 (8)	- lacking iron increases the chance of preterm labour, low birth weights and small for gestational baby being born (4) -too much intake could lead to miscarriage and pregnant complication such as preeclampsia (5)	red meat: 2-3 mg per 3 ounces tuna: 1mg per 3 ounces oyster: 8mg per 3 ounces egg: 1mg per egg tofu: 3mg per half cup green leaves: 3mg per half cup (13)
vitamin A	pregnant women: 770µg Non-pregnant women: 700µg (10)	Xerophthalmia	- more vitamin A required for fetes' tissue maintenance and growth (4) -too much vitamin A intake could increase of the chance of deformed baby being born and poison the liver (14) - xerophthalmia leads to night blindness which is in correlation with high infant deaths and low birth weights (4)	beef liver: 9,442mcg per 100 grams King mackerel: 252mcg per 100 grams lamb liver: 7,491mcg per 100 grams goat cheese: 407mcg per 100 grams (15)

Please see appendix 7.1 for all the other nutrients.

See Section 6 for our Persona.

1.1.3 Reasons behind Micronutrient deficiency in PW

From the study “Dietary Change during Pregnancy and Women’s Reasons for Change” , it is found that american pregnant women would reduce the intake of foods that could be potentially harmful for their pregnancy.(16) However, the study shows that they are not increasing their intake of foods providing important nutrients more required during pregnancy. Additionally, it is noticed that appropriate diets in pregnancy are challenged by food barriers such as food aversions, nausea, vomiting, constipation, tiredness, cravings.

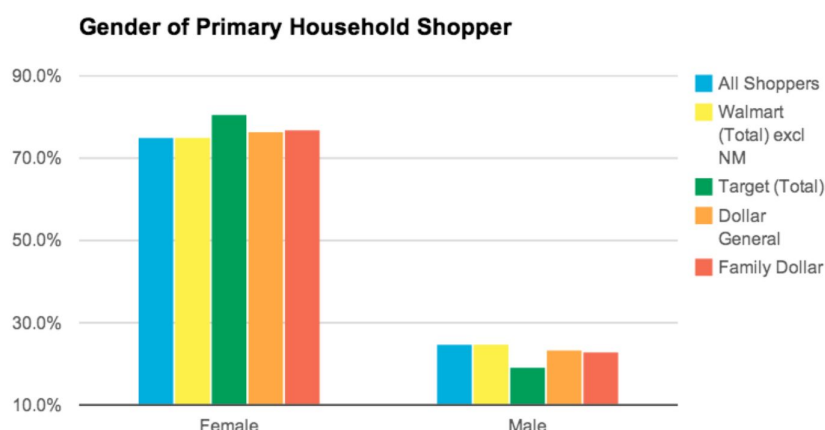
Another study in California suggests that pregnant women should receive advice from health professionals or educational resources.(17) A support that has proven to be effective as interventions generate an increase in recommended nutrient intakes and engagement in physical activities . This said, the California study also concludes that introducing a smartphone app in a pregnant woman’s lifestyle could highly reinforce healthcare interventions with professionals. Thus, a decision to provide service on an app to assist pregnant women following adapted diets in the most seamless way.

1.2 Why does it concern Walmart US?

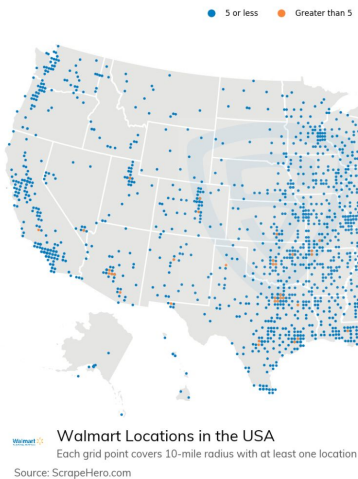
1.2.1 Walmart

Walmart is the world's biggest retailer with more than 11,400 stores in 27 countries across the world.(18) Many of its customers and biggest supporters are women and mothers: with a 3 to 1 buying ratio.(19)

WALMART SHOPPER GENDER



As Walmart US is the largest division of Walmart, accounting for about 65% of the company's sale, we decided to focus our analysis on the United States.(20)



(20)

Industry impact

Walmart provides suppliers with exposure to 200 million customers, with 75% being females. Due to its influence, Walmart could reduce the risks of malnutrition especially among pregnant women, one of the most vulnerable groups, by providing healthier food options.(21)

By encouraging healthy eating and offering products that satisfies the nutrition requirements during pregnancy, Walmart could further appeal to its target audience and consequently increase sales and profitability.

1.2.2 Fight against Malnutrition at Walmart

Walmart pledged to fight malnutrition through the Healthier Food for All program.

Its aim is to find innovative and creative solutions to connect people around the world with healthier food options, all while promoting culturally relevant nutrition education.



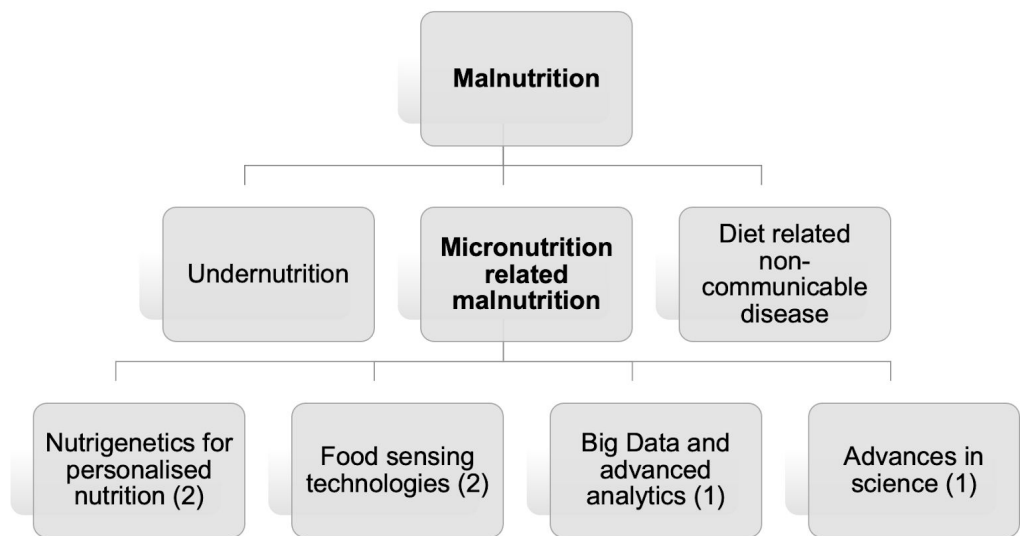
The focus is on two areas (22):

- 1) Improving access and availability to healthier food.**
- 2) Building individuals' confidence to select, prepare and serve healthier food.**

2. TRANSFORMATIVE INNOVATIONS

2.1 Transformative innovations

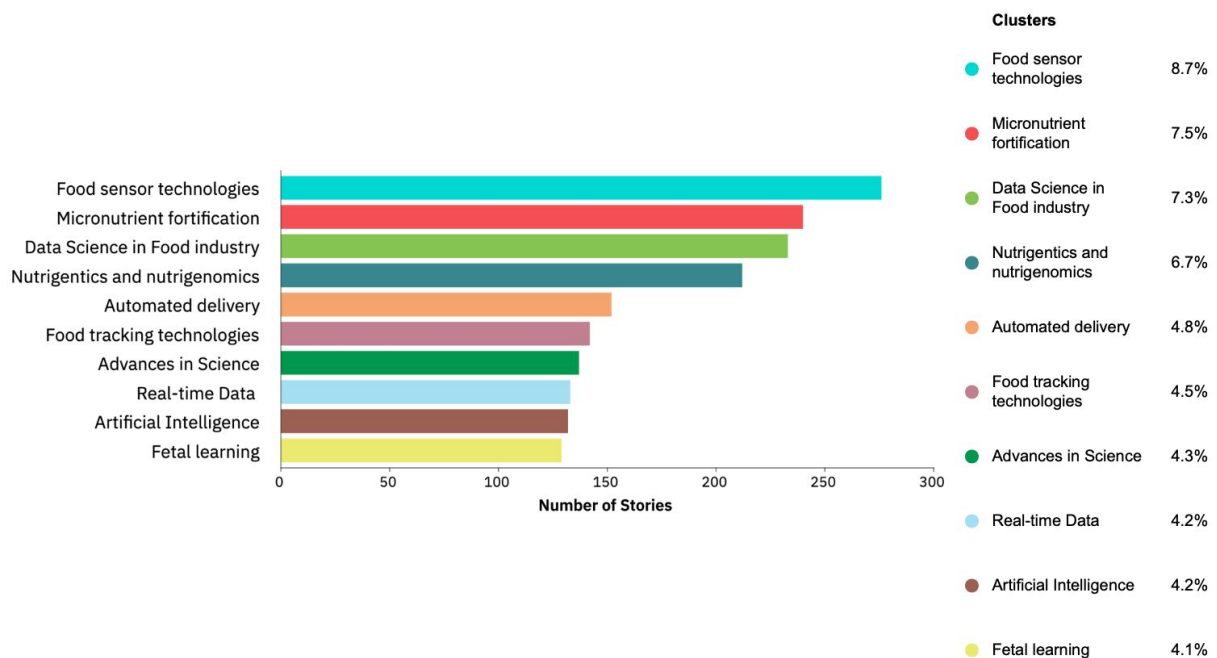
Based on the WEF report, 4 transformative innovations in Micronutrition-related malnutrition were identified, as shown below.(23)



2.2 Micronutrient deficiency in PW

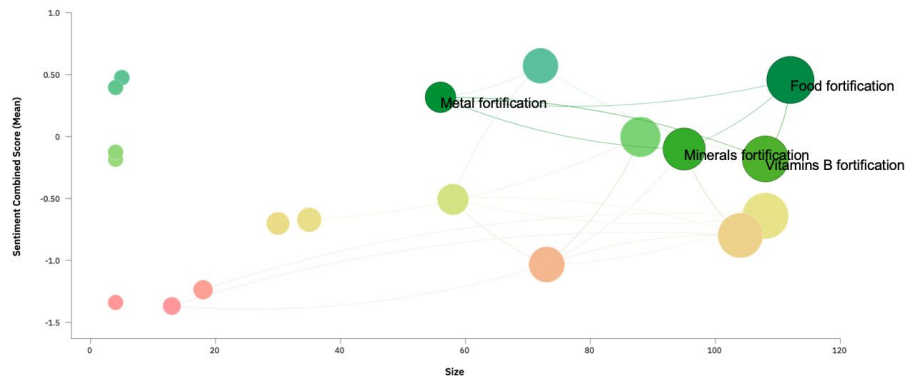
To fight micronutrient-deficiency in pregnant women, in addition to what found in SW3, we identified another transformative innovation - food fortification.

Based on the quid analysis below, it is decided to focus on Food sensing, Food fortification technologies and Big Data and advanced analytics.



The following quid analysis helped us to identify the subcategories of food fortification.

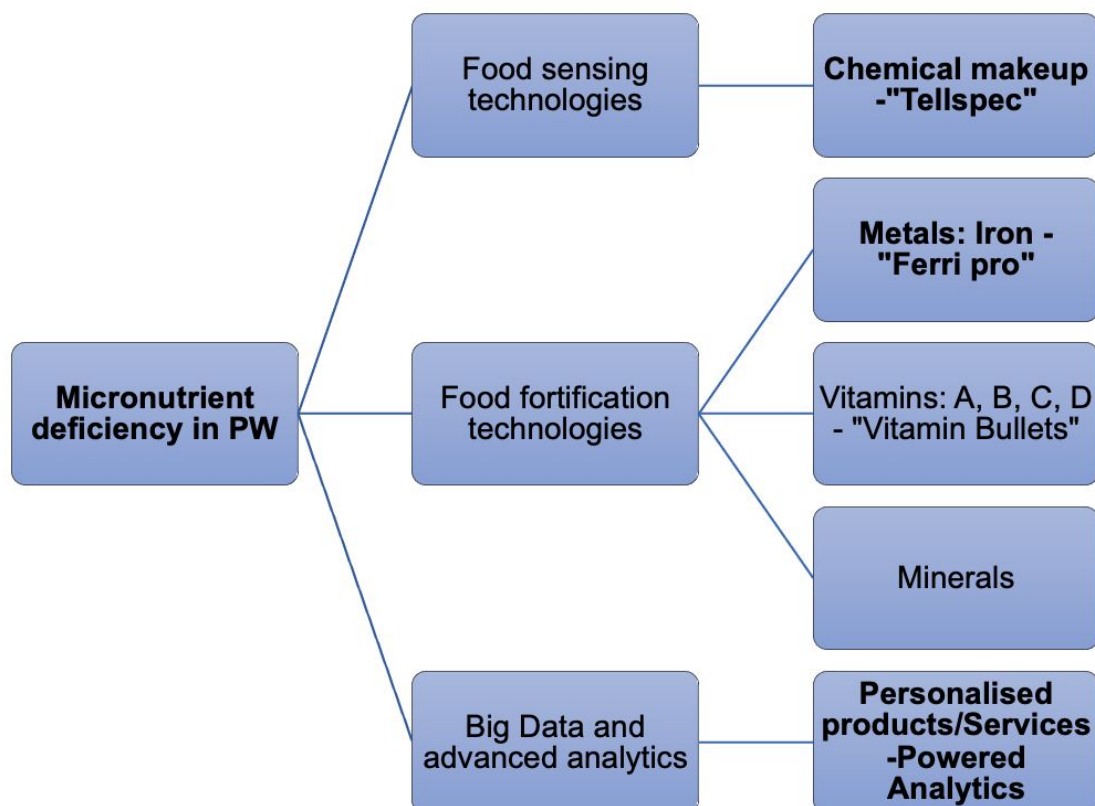
News article scatter plot aggregated into 19 clusters, 4 out of 19 selected. Colored by sentiment combined score (mean). Labeled by cluster.



Source: [Quid®](#)



Therefore, we derived our classification map:



2.2.1 Big Data and Advanced Analytics technology

Target has acquired Powered Analytics, a startup that focuses on personalizing in-store shopping through mobile technology, location data and predictive analytics.(24) The company uses advanced analytics to predict the likelihood of a woman being pregnant and her corresponding due date. Its mission is to identify pregnant customers buying patterns to further offer personalized promotions and advertisements. Complex regression analyses determine what products are correlated with what step of the pregnancy. For instance, it was found that vitamins purchases like magnesium,zinc and calcium are associated with the first trimester while unscented lotion is associated with the second semester of the pregnancy. Target collects data by assigning guest ID numbers for each customer. Information is then collected from the credit card used to purchase history. By implementing such technology, the grocer can anticipate what pregnant customers need in the future, and provide a seamless shopping experience.(25)

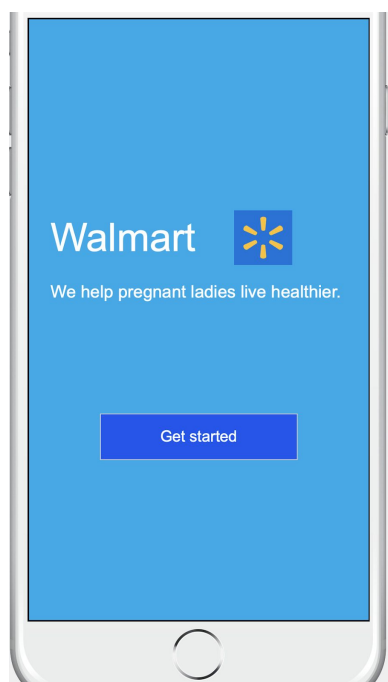
See **appendix 7.3** for more technology categories explained.

3.How does our product work?

The technology elements include the app interface and a cloud platform, which stores medical data on recommended vitamins intake based on a few variables and stores a list of Walmart products and user data (inputs and purchase history). It also generates diets based on products selected by the user, recommended by nutritionists.

3.1. Interactive prototype screenshots and service blueprint

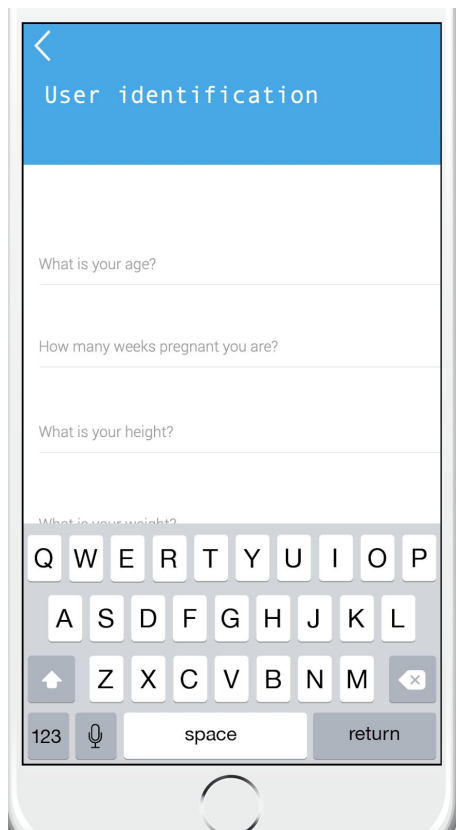
Screen 1



This is the home screen where the user clicks the button to start.

- User

Screen 2



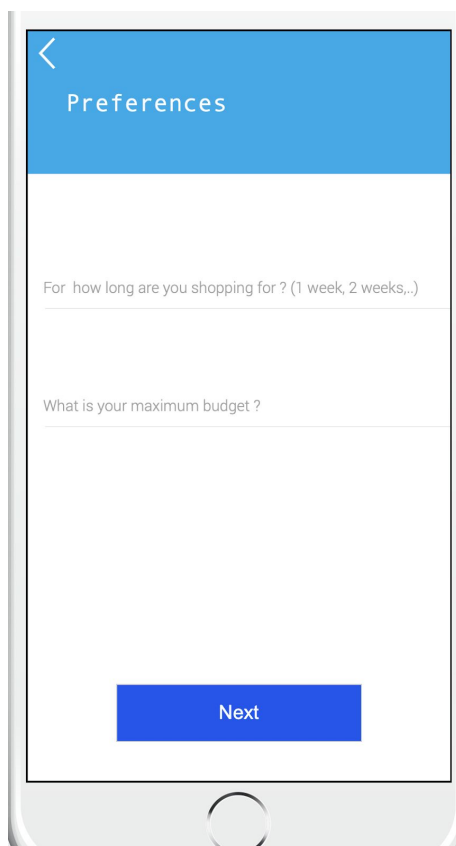
The identification page is only for new users. The user inputs her age, pregnancy weeks, height, weight and allergies.

- User

User inputs are sent to the cloud platform. Recommended intake of vitamins will later be made based on these and medical data – the algorithm searches this combination of values in a table. Also, it is eliminating from recommendations the Walmart items that contain the specified allergens.

- Backstage

Screen 3



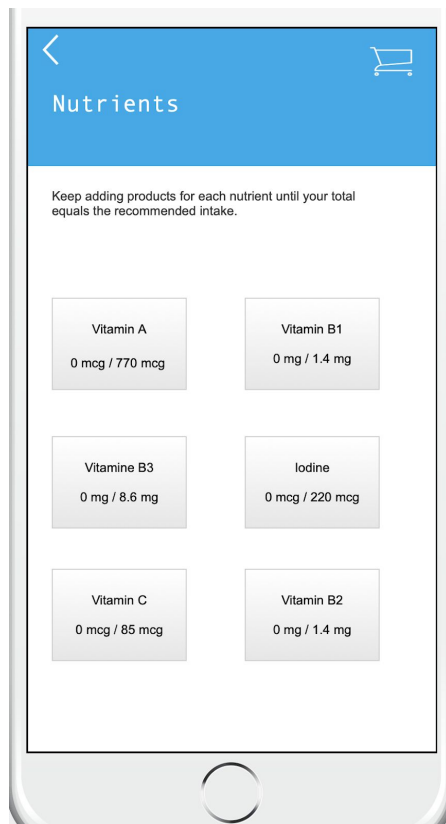
The user inputs the period she is shopping for (could be 3 days, a week) and the maximum budget. .

- User

User inputs are sent to the cloud platform. Recommended intake of vitamins will be updated for the selected period. Walmart products will be recommended according to the budget.

- Backstage

Screen 4



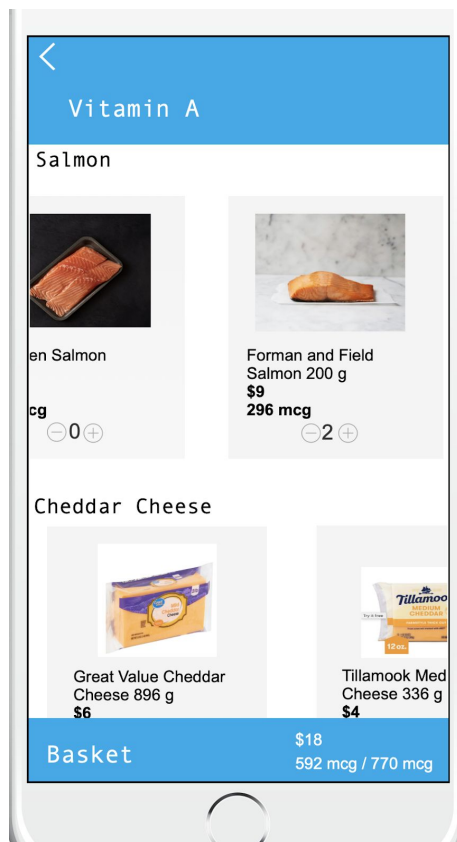
The user now sees her recommended intake in her selected period of time for more nutrients and how many nutrients the products she selected contain (now all are 0 as she didn't select any food). She has to click on each nutrient to select food until she scores the recommended intake.

- User

The recommended intake output is received from the cloud platform – the process was explained before

- Backstage

Screen 5



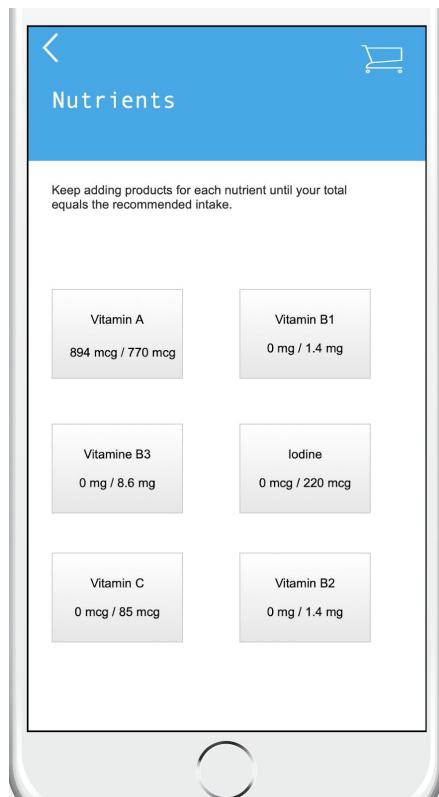
On Screen 4, the user clicked on Vitamin A. This page displays recommendations of products rich in the selected nutrient. The user can scroll to see more products and add them to the basket displayed at the bottom. She can see the total price and nutrient intake in the basket. After she has enough nutrients in her basket, she can click on the upper left corner to go back to the nutrients menu.

- User

The products are recommended based on the user's budget and purchase history. The algorithm uses ML to recommend the food that the user is most likely to buy based on her purchase history.

- Backstage

Screen 4



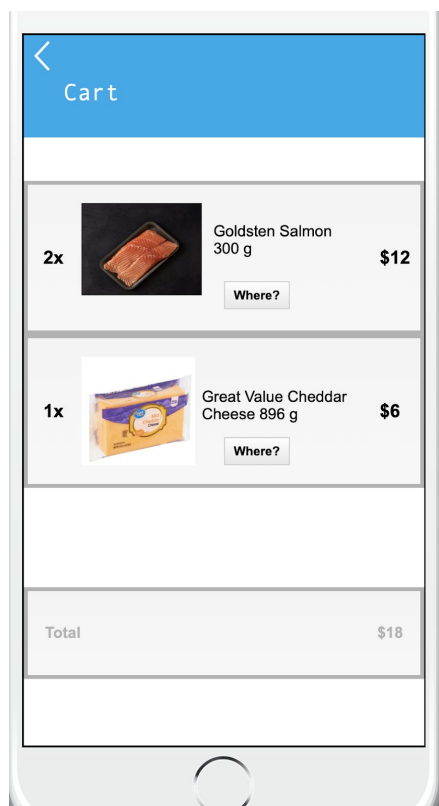
The user now selected products with enough intake for Vitamin A (see her selected intake is 894 mcg). She will repeat the process for each nutrient until her products score enough intake. Afterwards, she will click the cart icon on the upper right corner to see her products.

- User

The selected intake is updating based on the user's selected products.

- Backstage

Screen 6



The user can see the products in her cart along with the prices and total. She can click on the "Where" button to find the location of each product in the supermarket.

- User

The basket was created based on user's selected products.

- Backstage

Screen 7



The user can see her location (blue dot) and the location in the supermarket of the product she selected.

- User

The app needs to be granted access to the user's location. The product pin is received from the cloud platform which stores data of Walmart products and where they are located in the store.

- Backstage

See interactive prototype here (works for Vitamin A only):

<https://www.justinmind.com/usernote/tests/51443666/51444064/51460838/index.html>

3.2. Feasibility

Big data and advanced analytics have been used in the food industry for some years. It was identified by WEF as a disruptive innovation for the next 10 years.(26) Section 2 discussed an example of how Target uses this technology. One downside can be that the app will create lots of random product recommendations when the user uses it for the first few times, as it needs to learn from one's purchase history – after that, it will recommend 5 product types for each nutrient.

The user location needs a very high accuracy, which is not very feasible – GPS systems can show your moving location from one street to another but not for small distances such as movement between rooms. However, it is helpful that the user sees the pin of the product and if he is moving in the right direction or not.

The economic feasibility is discussed in the Implementation section.

4. Impact

A series of interviews was conducted to quantify the impact of the app. About 75% of respondents said that it would have been helpful if there was an app showing nutritional values of products.

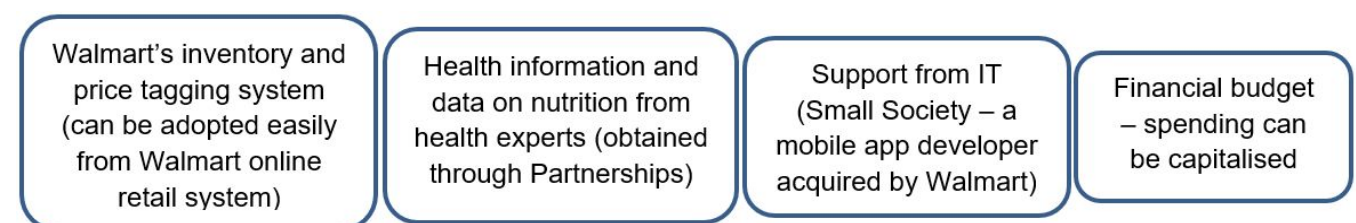
Moreover, 62.5% of respondents said that they would ideally buy products following a pre-generated list, consistent with their diet, either by a computer or doing it themselves. Also, 5 out of the 12 previously pregnant women interviewed suggested that having an app which would generate weekly diets would have been of use in sustaining their nutritional values.

Another series of interviews was conducted to test the prototype and quantify the potential impact and find improvements based on feedback. All subjects interviewed rated 5(highest) in the Usefulness category and 90% said that they would use the app during pregnancy. However, 60% percent of interviewees pointed out a difficulty in finding products in-store, and as a result, the app therefore contains a feature that can locate any product selected in-store.(Appendix 7.4)

A study found that the 'healthy' or 'health-conscious' pattern in pregnant women is positively associated with higher educational levels and education, even with a simple paper guideline, has a significant effect on dietary habits.(27) Another study concluded that, with an increasing number of women using apps during pregnancy, development of quality apps may have the potential to improve prenatal outcomes.(28) By continually following and engaging with our app, pregnant women benefit from information on nutritional values of products and diets generated in partnership with top nutritionists, which would help their dietary knowledge and increase their nutritional levels. It is also built to help maintain a constant diet throughout pregnancy, which eliminates not only micronutrient malnutrition, but also eating disorders.

5. Implementing the App in Walmart

5.1 Key Resources



(29)

5.2 Costs - please smartart for this

By creating the app in-house instead of outsourcing, it is estimated that Walmart Group will save up between 15-30% as this represents the average gross margin earned by mobile app developers.(30) Based on research, the cost of building an enterprise and multi-featured app ranges from \$50,000 to \$150,000.(31) Assuming the cost is \$100,000 and after applying 15% saving (a prudent approach), the Walmart Group is estimated to save up \$15,000 by choosing in-house service. In terms of duration, the app is likely to take somewhere between 3-6 months. Reasonably, the in-house service should speed up the process as there is a closer collaboration with Walmart's retail business.

5.3 Potential Implementation Issues

One of the biggest challenges during implementation is the level of awareness required to attract pregnant women to use the app. With around 3.7million (2019) pregnant women in the US, detailed marketing campaigns will be required to capture at least 70% of the pregnant women market share.(32) The logic behind the 70% target is from the research found and included in section 1.2.1. Another challenge is to ensure the high accuracy of prediction that the app will use to make recommendations to pregnant women based on their purchase history, as the higher the accuracy, the higher is the customer retention achieved by the app.

5.4 Why is Walmart an appropriate place to develop this idea?

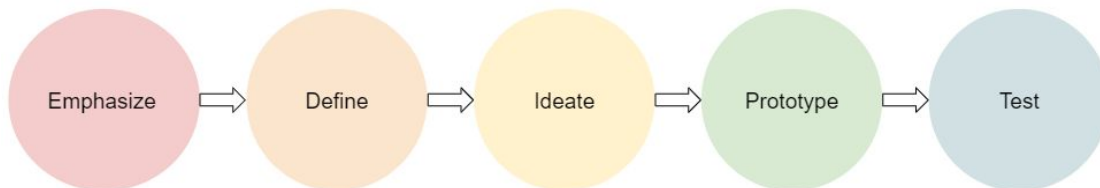
As Walmart is the largest US food retailer, it is certainly appropriate to deploy this new idea, given that millions of pregnant women visited Walmart every year. By implementing this idea, Walmart is expected to be benefited from:



Notably, Walmart settled a pregnancy discrimination case in 2020 where Walmart was fined \$14million for denying pregnancy accommodations for pregnant women.(33) Hence, Walmart can be seen as providing more services for pregnant women and improving its brand image. Once launching is successful and receives positive feedback, the app can be amended to target more vulnerable groups, such as elderly, to offer them a better nutritious diet.

6. Design Thinking Process

To design a new transformative innovation for Walmart, a design process from Standard d.school (34) has been followed.



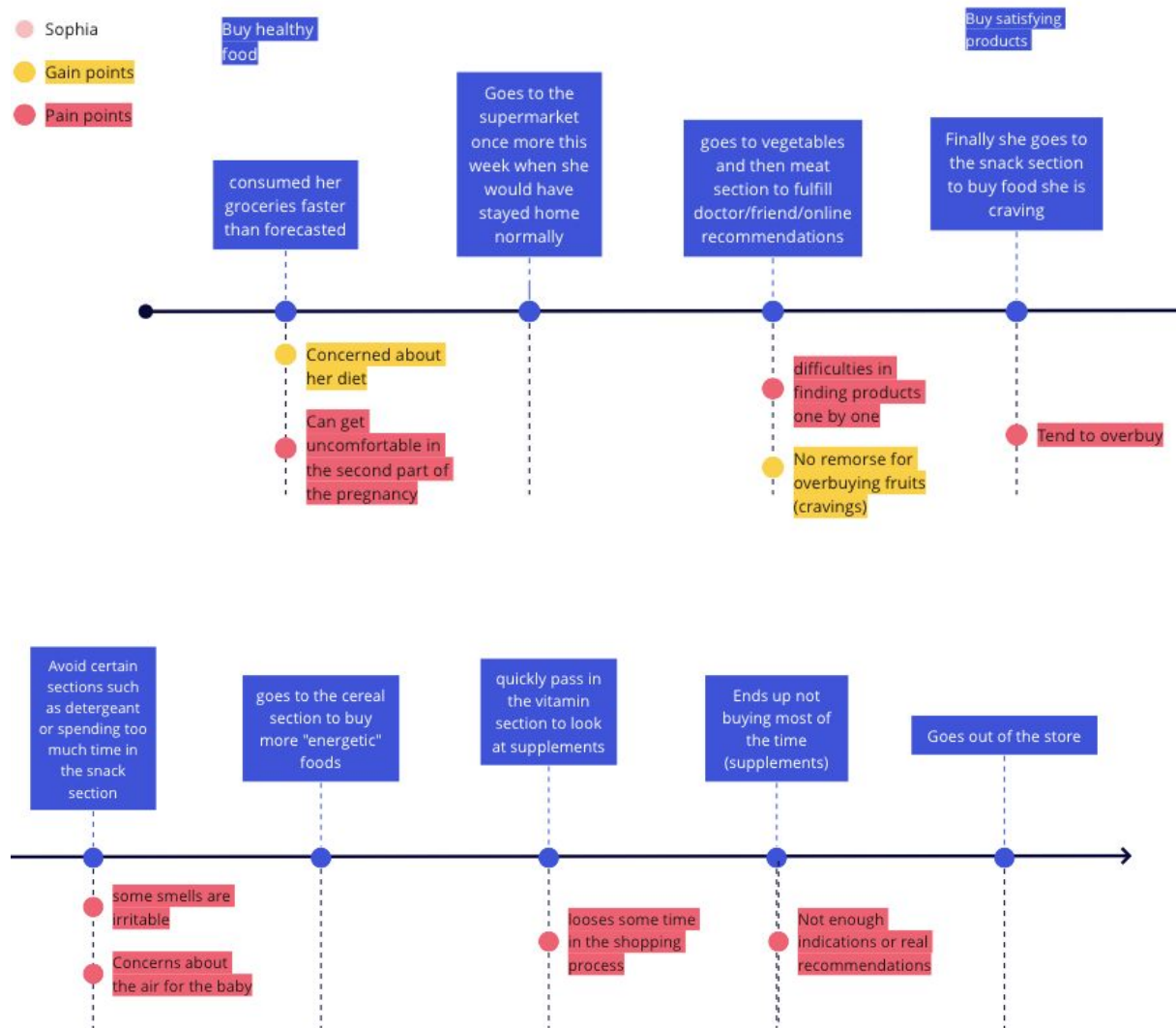
In the Emphasize step, the initial desk research was carried out to understand the problem and which group is most affected by the problem identified. After deciding the target customer based on the desk research, an in-depth interview was done with 12 mothers/pregnant women who shared their pregnancy experiences.

- how old were you when you were pregnant?
- how long ago were you pregnant?
- Did you notice sudden change in your consumption behavior?
- Did you go more often or less often to the supermarket during pregnancy? How many times a week? Why so?
- During grocery shopping, were you shopping for foods rich in some nutrients?
- Are you aware that pregnant women should intake more micronutrients?
- Have you purchased any supplements during pregnancy? If yes, what micronutrients does it provide specifically?
- Did you experience food aversion during your pregnancy?
- Did you have any concerns with your micronutrition?
- Was it difficult/ challenging to find nutritious foods in grocery stores that you are looking for specifically?
- what would have been your ideal way of grocery shopping when you were pregnant?
(do not think about the feasibility, use your imagination)
- Describe your grocery shopping journey/routine when you were pregnant?

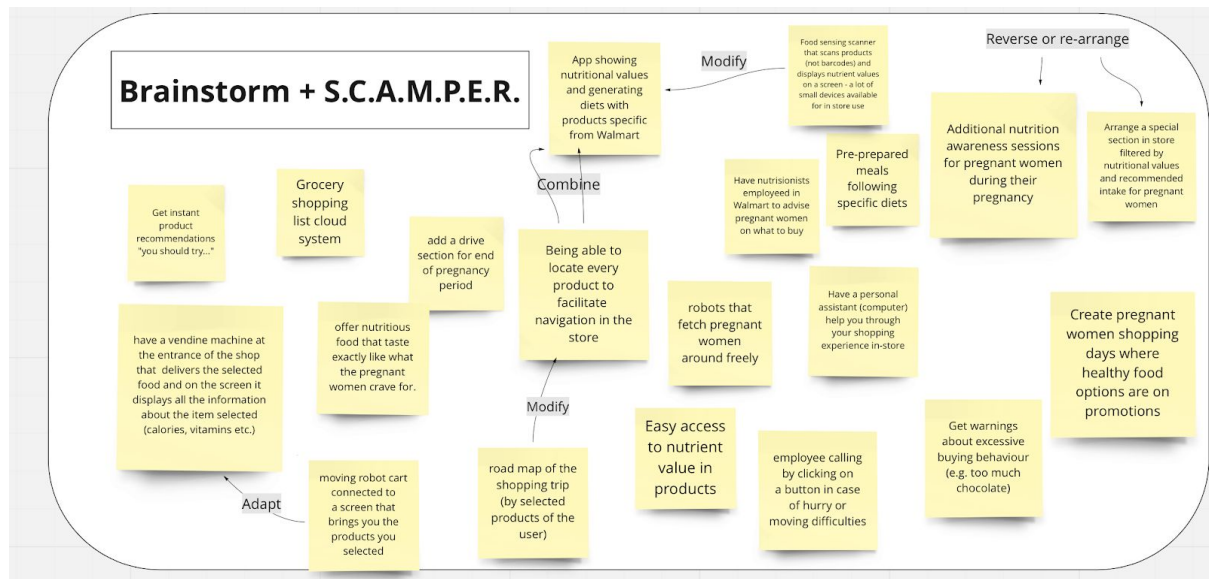
In the define step, a persona and user journey map were created based on the interviews with 12 mothers/pregnant women



The Customer Journey Map helps us to track pleasant and unpleasant steps in the user's journey. What is the user feeling along the shopping experience and why so? This way, we were able to search and identify means that could improve a customer's overall grocery shopping at Walmart.



In the Ideate step, we brainstormed 20 ideas before coming up with our solution. We used the SCAMPER method to combine, modify or adapt ideas. See the figure below.



For our final solution, we have a combination of 3 of the ideas - an app showing nutritional values with products from Walmart, a road map of the shopping trip and diet generation. We also considered the value that could be created from the remaining ideas.

In the Prototype step, we created an interactive prototype using Justinmind. The users can click, add inputs, scroll, add products to a shopping cart. Moreover, we created a simplified version of a service blueprint to show what the user sees and does and what happens in the backstage for each screen of the prototype.

In the Test step, we tested the prototype by allowing 10 participants to interact with it, recording the results, recommendations and impressions through one-on-one interviews.(see Appendix 7.4)

7. Appendix

7.1. Micronutrients

Micronutrient	USA Recommended Daily Allowance (RDA)	Relevant Micronutrient deficiency disease	The importance of following the intake recommendation during pregnancy	food rich in micronutrient
Iron	<p>pregnant women: 27mg</p> <p>Non-pregnant women: 18mg</p> <p>(10)</p>	Anaemia: keep increasing constantly in the USA pregnant women since 2002 from 11.68% 16.16% in 2016 (8)	<p>- lacking iron increases the chance of preterm labour, low birth weights and small for gestational baby being born (4)</p> <p>-too much intake could lead to miscarriage and pregnant complication such as preeclampsia (5)</p>	<p>red meat: 2-3 mg per 3 ounce</p> <p>tuna: 1mg per 3 ounce</p> <p>oyster: 8mg per 3 ounce</p> <p>egg: 1mg per egg</p> <p>tofu: 3mg per half cup</p> <p>green leaves: 3mg per half cup</p> <p>dried fruit: 1mg per one-fourth cup</p> <p>rasberry: 1mg per cup</p> <p>(13)</p>
Folate	<p>pregnant women: 600µg</p> <p>Non-pregnant women: 400µg</p>	Anaemia	<p>-crucial for cell division and tissue growth in fetus (4)</p> <p>-deficiency in folate could lead to low birth weight and fetus with neural tube abnormalities</p>	<p>cooked lentils: one cup 358mcg</p> <p>asparagus: half cup 134mcg</p> <p>spinacy: one cup 58.2mcg</p> <p>one orange: 55mcg</p>

			<p>(35)</p> <p>-too much intake could lead to a baby being born with disease such as asthma and cancer cell growth (36)</p>	<p>one avocado: 164mcg (37)</p>
iodine	<p>pregnant women: 220µg</p> <p>Non-pregnant women: 150µg</p> <p>(10)</p>	iodine deficiency disorders	<p>-lacking iodine could cause a baby being born with low IQ, congenital hypothyroidism in fetus, goitre in both mother and fetus, miscarriage and early infant death (4)</p> <p>-too much iodine intake could cause a baby being born with congenital hypothyroidism (11)</p>	<p>kombu kelp: 2,984mcg per gram</p> <p>wakame: 66 mcg per gram</p> <p>cod: 3 ounces 63-99mcg</p> <p>cheddar cheese: 65mcg per ounce</p> <p>shrimp: 35mcg per ounce</p> <p>(12)</p>
vitamin A	<p>pregnant women: 770µg</p> <p>Non-pregnant women: 700µg</p> <p>(10)</p>	Xeroftalmia: More than 6 million pregnant women are affected	<p>- more vitamin A required for fetus' tissue maintenance and growth (4)</p> <p>-too much vitamin A intake could increase the chance of deformed baby being born (14)</p> <p>- xeroftalmia leads to night blindness which is in correlation with high infant</p>	<p>beef liver: 9,442mcg per 100 grams</p> <p>King mackerel: 252mcg per 100 gram</p> <p>lamb liver: 7,491mcg per 100 grams</p> <p>goat cheese: 407mcg per 100 grams</p> <p>salmon: 149mcg per 100 grams</p> <p>(15)</p>

			deaths and low birth weights (4)	
Vitamin B1	<p>pregnant women: 1.4mg</p> <p>Non-pregnant women: 1.1mg</p> <p>(38)</p>	Beriberi	<p>-lacking vitamin B1 could destroy fetus' developing brain (4)</p> <p>-a possibility of allergies or skin irritation as a result of too much intake (39)</p>	<p>sunflower seed: 2mg per cup</p> <p>seaweed: 2.66mg per cup</p> <p>cooked lentil: 0.53mg per cup</p> <p>asparagus: 0.3mg per cup</p> <p>soybeans: 0.53mg per cup</p> <p>(40)</p>
Vitamin B2	<p>pregnant women: 1.4mg</p> <p>Non- pregnant women: 1.1mg</p> <p>(41)</p>	Ariboflavinosis	<p>-lacking vitamin B2 could lead to preeclampsia, congenital heart defects in fetus and low birth weight (4)</p> <p>-too much intake could lead to allergies or diarrhoea (42)</p>	<p>beef: 0.9mg per 100 grams</p> <p>mushroom: 0.5mg per 100 grams</p> <p>salmon: 0.5mg per 100 grams</p> <p>milk: 0.2mg per 100 grams</p> <p>spinach: 0.2mg per 100 grams</p> <p>(43)</p>
Vitamin B3	<p>pregnant women: 18mg</p> <p>Non-pregnant women: 14mg</p> <p>(44)</p>	pellagra	<p>-lacking vitamin B3 could lead to preeclampsia, congenital heart defects in fetus and low birth weight (4)</p> <p>-too much intake could destroy liver or cause skin flush (45)</p>	<p>beef liver: 3 ounces 14.7mg</p> <p>chicken breast: 3 ounces 11.4mg</p> <p>tuna: 5.8 ounces 21.9mg</p> <p>mushroom: 2.5mg per cup</p> <p>pork: 3 ounces 6.3mg</p>

				(46)
Vitamin C	<p>pregnant women: 85mg</p> <p>Non-pregnant women: 75mg</p> <p>(10)</p>	Scurvy	<p>-oxidative stress is one of the causes for pregnant complications, thus sufficient amount of vitamin C is required to stop oxidative stress happening in the first place (4)</p> <p>-vitamin C reduces the chance of premature rupture of membranes (4)</p> <p>-too much intake could lead to preterm labour (47)</p>	<p>kakadu plums: 5,300mg per 100 grams</p> <p>one guava: 126mg</p> <p>one green chili pepper: 109mg</p> <p>one American perssimons: 16.5mg</p> <p>blackcurrents: half cup 101mg</p> <p>one lemon: 83mg</p> <p>acerola cherries: half cup 822mg</p> <p>(48)</p>
Vitamin D	<p>pregnant women: 600 IU</p> <p>Non-pregnant women: 600 IU</p> <p>(10)</p>	Rickets, Osteomalacia	<p>-fetus needs vitamin D for its bone and growth which can be only obtained through its mother (4)</p> <p>-vitamin D deficiency during pregnancy could lead to preeclampsia, gestational diabetes mellitus, preterm labour and small for</p>	<p>salmon: 386 IU per 100 grams</p> <p>mushrooms: 2,348 IU per 100 grams</p> <p>egg yolks</p> <p>milk</p> <p>oyster</p> <p>(50)</p>

			gestational baby being born (4) -too much intake could lead to the fetus with hypercalcemia (49)	
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(51)

7.2 Quid Search

Search 1: News and blogs

TRANSFORMATIVE INNOVATION OR INNOVATION OR TRANSFORMATIVE TECHNOLOGY OR TECHNOLOGY AND PREGNANT WOMEN OR PREGNANCY AND MICRONUTRIENT OR MICRONUTRITION OR VITAMIN A OR VITAMIN C OR VITAMIN D OR VITAMIN B OR METALS OR VITAMINS OR IRON OR FOLIC ACID OR THIAMINE AND FOOD SENSING TECHNOLOGY OR DATA ANALYTICS OR AI OR ARTIFICIAL INTELLIGENCE OR FOOD FORTIFICATION TECHNOLOGY OR FOOD SENSING TECHNOLOGY OR NUTRIGENETICS FOR PERSONALISED NUTRITION OR BIG DATA AND PREGNANT WOMEN OR PREGNANCY OR PREGNANT OR PREGNANT WOMAN OR [PREGNANT MOTHERS](PREGNANT MOTHERS OR "pregnant women" OR "expectant mothers")

Search 2: News and blogs

TRANSFORMATIVE INNOVATION OR INNOVATION OR TRANSFORMATIVE TECHNOLOGY OR TECHNOLOGY AND PREGNANT WOMEN OR PREGNANCY AND MICRONUTRIENT OR MICRONUTRITION OR VITAMIN A OR VITAMIN C OR VITAMIN D AND FOOD FORTIFICATION

7.3 Transformative innovations

7.3.1 Food sensing technology

TellSpec is a food sensor that scans food directly (23) to analyse chemical compounds in the food (52) to give information such as allergens, chemicals, calories, macronutrients and micronutrients of the food. (53)

The technology involves the use of the spectrometer, machine learning and mobile app to deliver the relevant information to users. (23) The spectrometer organises photons absorbed through the laser (52) which is then analysed using the machine learning engine and presented onto the users' mobile apps, giving relevant information about the food scanned. (23)

Although it can be utilised by anyone who is interested in managing diet and health, it is expected to be useful for pregnant women as the scanner not only gives the micronutrient contained in the food but also other chemical compounds of the food such as calories and allergens.

7.3.2 Food fortification technology

In this section, we would be only talking about one example of food fortification, which is iron fortification.

Ferri pro was developed to combat and prevent iron deficiency anemia, one of the most severe micro nutritional deficiencies affecting pregnant women. Food suppliers can adopt it to provide healthier food options to the general audience as well as using it in personalised products to boost specific nutrient content for a user's specific requirement.

The technology is a novel protein-iron complex that uses food-grade materials and a unique processing method to fortify certain foods without negatively affecting product quality. Typically, other forms of iron when added to products may interfere with the taste and colour, negatively impacting customer acceptance.(54)

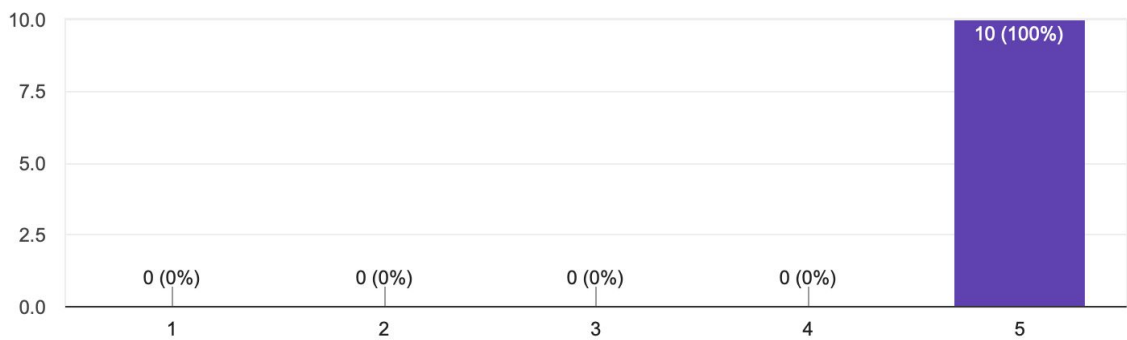
Iron fortification practices can improve the nutritional intake of pregnant women, reducing their risk of having a premature baby or infant death immediately after birth. (55)

7.4 Interviews

Interview results from testing the prototype and quantify the impact.

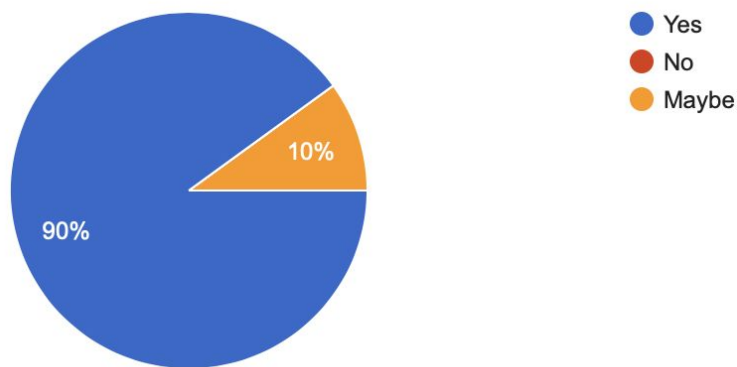
How would you rate the Usefulness of the app?

10 responses



Would you have used the app during pregnancy?

10 responses



What can be improved or added in the app?

10 responses

Location of products
It would be useful to have a feature to locate products in store
Product location
Design of the app
Possibility of buying online
A way to locate products
Better categorization of products
Overall appearance of the app
Locating products in store by category
Possible locations of products in stores

7.5 Feedback

After receiving feedback during the week from both the 1-1 sessions we had with the Teaching Team and the feedback from our interim and final presentations, we noted and acted on:

- Focus our problem only on the USA
- Focus only on pregnant women, eliminate lactating women and infants
- Refine problem statement, find correlations between pregnant women and Walmart
- Compare results of pregnant women to non-pregnant women
- Skip introductory information, dive into the problem right away

After viewing other teams' presentations, we noted and acted on:

- Be more concise, don't go that much into detail. Clear arguments.
- Break down into more categories
- Understand the processes involved

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