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ADDRESSING HUNGER, UNDER-NUTRITION, AND FOOD INSECURITY IN INDIA: A FOOD DELIVERY APPLICATION SOLUTION

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Abstract: An application that works with the assortment and dispersion of surplus food from food enterprises and PGs could assist with expanding the productivity and viability of food gift endeavors in India. Food recipients may be able to request food donations based on their specific requirements, and food donors may be able to easily schedule pickups for surplus food through the use of such an application. By enabling more precise tracking and management of surplus food, technology could also contribute to a reduction in food waste. In recent years, India's economic growth and development have advanced significantly. However, the nation faces a significant obstacle in the form of hunger, malnutrition, and food insecurity. This examination paper investigates the causes and outcomes of food weakness in India, including neediness, inconsistent dispersion of assets, unfortunate foundation, and environmental change. In addition, it discusses the effects of hunger and undernutrition on individuals as well as society, including malnutrition, health issues, poverty, and social unrest. The paper suggests addressing poverty, improving distribution channels, increasing food production, and adapting to climate change as potential solutions. It emphasizes the significance of government programs and policies, such as the National Food Security Act and the Integrated Child Development Services, in reducing food insecurity and improving nutritional outcomes. This research emphasizes the critical need for India to overcome food insecurity and ensure that all of its residents have access to sufficient, nutrient-dense, and reasonably priced food. By taking proactive steps to address this problem, India can create a society that is more just and long-lasting as well as improve the health and well-being of its people.

Keywords: Hunger, Undernutrition, Food insecurity, Food waste, Food donation, Food delivery application, Public distribution system (PDS), Malnutrition, Food Access, Food supply chain, Social responsibility, Humanitarian aid. Hunger, Undernutrition, Food insecurity, Food waste, Food donation, Food delivery application, Public distribution system (PDS), Malnutrition, Food Access, Food supply chain, Social responsibility, Humanitarian aid.

I. INTRODUCTION

India, which has a membership of more than 1.3 billion, is one of the biggest nations in the world. Despite the continued strong economic expansion, the nation continues to face serious problems with hunger, undernutrition, and food insecurity. This research paper will examine the current situation of hunger, malnutrition, and food security in India, along with its causes, effects, and potential solutions.

Causes of Food Insecurity in India: Poverty is one of the main causes of hunger and malnutrition in India. The majority of people live in substandard conditions and have limited access to education, healthcare, and food. Lopsided asset dispersion: The uneven distribution of resources, including food, water, and land, is one of the main causes of food insecurity in India. As a result, disadvantaged individuals have less equal access to food and water. Inadequate facilities: India's inadequate capacity for transportation and storage may also contribute to food insecurity. This is because food could spoil and be wasted, especially in rural areas. Environmental change: India's food security has been significantly compromised as a result of the effects of climate change, particularly in the form of floods and droughts.

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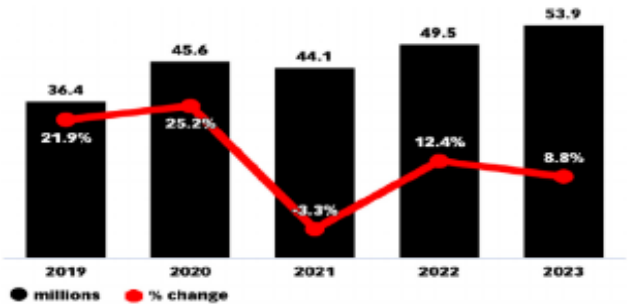

Fig.1. Food delivery app users.

Consequences of Hunger, Under-Nutrition, and Food Insecurity in India:
Malnutrition: Hunger and undernutrition can lead to malnutrition, particularly among children. This can have long-term consequences for their health and development, including stunted growth and reduced cognitive abilities.

Health issues: A number of health issues, such as anemia, vitamin deficiencies, and other ailments, can be brought on by food insecurity.

Poverty: Food insecurity can contribute to poverty, particularly for vulnerable communities who rely on agriculture for their livelihoods.

Social unrest: Food insecurity can also contribute to social unrest, particularly in regions with high levels of poverty and inequality.

Possible Solutions to Hunger, Under-Nutrition, and Food Insecurity in India:
Increase food production: One of the key solutions to food insecurity in India is to increase food production, particularly in vulnerable regions. This can be done through increased investment in agriculture, including irrigation and other infrastructure. Improve distribution: Improving distribution channels, including storage and transport facilities, can also help to reduce food wastage and ensure that food reaches vulnerable communities. Address poverty: Addressing poverty is also critical to reducing food insecurity in India. This can be done through a range of measures, including increasing access to education and healthcare and creating employment opportunities in rural areas. Adapt to climate change: India must respond to the implications of global warming, especially in areas that are susceptible. This can be accomplished by taking steps like developing drought-tolerant plants, improving water management, and enhancing early warning systems.

II. BACKGROUND STUDY

Food waste is a significant problem in India, estimating that up to 40% of the country's food production is wasted. At the same time, millions of Indians experience hunger and undernutrition, with many struggling to access sufficient and nutritious food. While there are various causes of food insecurity in India, including poverty, inadequate infrastructure, and climate change, reducing food waste and redistributing surplus food to those in need is one potential solution. Food industries and PGs are two potential sources of surplus food that could be collected and redistributed to those experiencing hunger. Food industries, such as restaurants and hotels, often generate large amounts of surplus food, while PGs may have excess food due to variations in occupancy rates. However, there are currently limited mechanisms in place to collect and distribute this surplus food to those in need.

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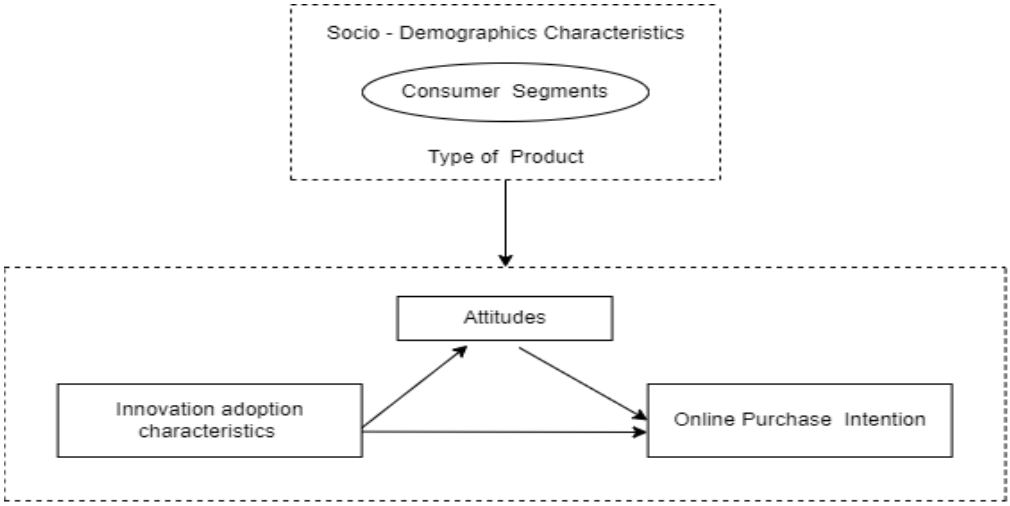

Fig.2. Conceptual model of the factorial structure

There are several existing initiatives in India that aim to collect and distribute surplus food, including the Akshaya Patra Foundation and Feeding India. However, the use of an application could help to scale up these efforts and make them more accessible to a large range of food donors including recipients. In addition to that, the use of an application could help to increase Transparency and accountability in the food supply process fosters trust and cooperation among stakeholders. Hunger, malnutrition and food security in India require multiple approaches. One way to reduce food waste and provide much needed food to hungry people in India is to use an app to collect and distribute food items from food businesses and PG. Availability and quality of food, donors willingness to participate, and food shoppers' ability to access the app and request donations are just some of the many factors that determine the effectiveness of this strategy.

Ladies from the town of Thuha in the Punjab region of northern India will set an example and recruit members. There are approximately 2,500 people living in 500 houses in Thuha [1]. In this study, interviews with 100 households will be conducted using a convenience sample. All families, regardless of size or type, will be invited to the event; Women will be interviewed first, and everyone who takes part must be at least 18 years old. According to recent research conducted in India [2], women have a substantial impact on the security of the household's food supply, particularly in households where males periodically travel to cities for work. This demonstrates a liking towards women. Before any research operations start, the sarpanch, the duly elected village chief, shall be briefed of the study and meet with the research team. With the Sarpanch's consent, each home will be informed of the study's goals and its data collection criteria, including how long the survey will last and what measurements are necessary. The individual will then be asked for their verbal, informed consent.. Individuals and families are not required to participate; each family can only make one request to participate. Will collect data through structured face-to-face interviews, either in the participant's home or in a public location agreed upon by both parties. The accompanying points will be talked about in interviews: dietary assessment (24-hour dietary review, not two consecutive days), housing facilities, related information agriculture, including home-based farming activities, food security status (as measured by the USDA Household Food Security Scale), and demographics. Households will be interviewed up to three times, and the total amount of time spent in interviews should be between 30 and 60 minutes. Anthropometric measurements (weight, height, waist-hip). In addition to the interviews' audio recordings, written notes will be used (see Supplementary Material). The meetings will be led in Punjabi, and at least one familiar Punjabi and English interpreter will be present to ensure that any questions or follow-ups that are asked during the meeting are understood simultaneously. The interviews will focus on four main areas.

Social and Monetary: Questions about family size, composition, education level, occupation, and agriculture are open-ended in this section. Sanitation: Each of the six food safety measures that Blumberg and Bialostosky [3] developed will be utilized. Participants were asked on this scale how much they ate, how much they spent, and how much they spent. They'll have the option to conclude regardless of whether they're getting enough. Four will concentrate on:
a) Because we need more money to buy more food, the food we buy slowly won't last long.Have you had any similar experiences in the past month?. b) The cost of food is perilously high. Have you experienced anything like this in the past month? c) Have any seniors in your family, including yourself, cut back on or skipped meals because they couldn't afford them in the past month? Every other week, nearly every week, or never? d) Did you eat because you were so hungry last month? If. In keeping with the concept put forward by Agarwal and Seth [4], questions 1 and 2 will be classified with 0 for "not true" and 1 for "sometimes/mostly yes." Never obtains a score of zero, "Nearly every week, but not every week" gets a one, and so on. In response to question 4, the values for "yes" and "no" will be 1 and 0, respectively.

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A household that received a score of zero or one will be regarded as food safe, while a household that received a score of three or more will be regarded as food insecure due to starvation. Households with at least two weak resources are thought to be at risk of food insecurity. In the interviews, questions were also asked about the family's eating habits, how much they ate, who made decisions, and how they bought food.With their shoes removed, participants will be weighed on a Tanita electronic scale with a precision of 0.1 kg. With an accuracy of 0.5 centimeters, the height will be measured with a portable Seca 213 rangefinder. The average value will be used in the calculation, and each measurement will be repeated twice. By dividing your height in meters squared by your weight in kilograms (kg), you can find your BMI. A body mass index (BMI) of 25 kg/m2 is considered to be obesity in India [10]. b) It has been demonstrated that the waist-to-hip ratio is a measure of health outcomes, particularly cardiovascular disease [11]. With the subject standing and breathing normally, measure the waist circumference (cm) of the subject with a Seca tape measure at the midpoint between the flower's midpoint and the iliac crest of the midaxillary line [12]. Abdomen outline (cm) will be estimated at the vastest mark of the more prominent trochanter.

Divide the waist size by the hip size to get the waist-to-hip ratio. The women in this study would use a waist-to-hip ratio between 80 cm and 0.80 because Asians are more likely than Europeans to have a smaller waist [13]. provides information on body fat distribution and accuracy that is superior to BMI alone [14]. An interview called the 24-Hour Diet Review will be used to get detailed information about the respondent's diet.
The quantity and method of preparation of all meals and drinks consumed in a 24-hour period will be included in this data. Women are best able to provide information about food consumption within their families because they are primarily in charge of food preparation [15]. Consequently, the fundamental objective of 24-hour information assortment will be ladies. It has been demonstrated that excessive competition and imagery can improve recall [16] and can be used for 24-hour food recall.

III. PROBLEM STATEMENT

The problem statement of a food delivery application based on Hunger providing food to those who are in hunger where the food is collected from different food industries and PGs using an application is the issue of food waste and hunger. In India, there is a significant amount of food waste generated in the food industry and PGs due to factors such as overproduction, expiry, and quality control. At the same time, there are also millions of people in the country who suffer from hunger and undernutrition. The food delivery application aims to address this problem by providing a platform for food industries and PGs to donate their surplus food to those in need. However, the current methods of food donation and distribution are often inefficient and can result in food wastage or uneven distribution. There is a need for an efficient and effective food delivery system that can match food donors with recipients based on their location, food preferences, and other factors. The problem statement, therefore, is to develop a food delivery application that can facilitate the collection and distribution of surplus food from food industries and PGs to those in need. The application should be user-friendly, reliable, and scalable, and should address the challenges of food waste and hunger in India.

IV. EXISTING WORK

Here is some information about existing applications and initiatives in India that aim to collect and distribute surplus food to those experiencing hunger:

1. **Feeding India:**
   Feeding India is a non-profit organization that aims to eliminate food waste and hunger in India. The organization uses a mobile application to connect food donors with volunteers who collect and distribute surplus food to those in need. Feeding India has a presence in over 65 cities across India and has served more than 23 million meals to date.

2. **Robin Hood Army:**
   The Robin Hood Army is a voluntary work group that works to combat hunger and food waste in more than 80 Indian towns. Via a network of volunteers, the organization gathers leftover food from restaurants and gives it to people in need.

3. **Zomato Feeding India:**

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Zomato Feeding India is a collaboration between the food delivery platform Zomato and the Feeding India organization. The initiative aims to collect excess food from restaurants and donate it to those in need. Customers can also donate meals through the Zomato app.

4. **Food Cloud:**
   Food Cloud is an internet marketplace that connects people interested in handmade meals with caterers and home cooks. By collaborating with Charities and other groups, the portal also enables users to give extra food to people in need.

5. **Too Good To Go:**
   A mobile app called too good to go encourages users to buy extra food from cafes, restaurants, and supermarkets at reduced pricing in an effort to prevent food waste. The app is currently available in several cities across India, including Delhi, Mumbai, and Bangalore.

These initiatives and applications demonstrate the potential for technology to play a role in reducing food waste and addressing hunger and undernutrition in India. However, there are still many challenges and barriers to overcome, including the need for greater awareness and participation among food donors and recipients, as well as the need for effective coordination and management of surplus food collection and distribution.

V. METHODOLOGY

Food donation delivery application have become increasingly popular in recent years as a way to connect food donors with food banks and other organizations that serve people in need. These applications can help streamline the donation process, reduce waste, and ensure that food reaches those who need it most. However, designing an effective food donation delivery application solution requires a structured methodology that takes into account the needs of the stakeholders and the technical requirements of the application. In this article, we will outline a design methodology for a food donation delivery application solution.

step 1: Identify the Stakeholders

The first step in designing a food donation delivery application solution is to identify the stakeholders who will be using the application. This includes donors, recipients, and any intermediaries such as food banks or charities. It is important to understand the needs and requirements of each stakeholder to ensure that the application meets their needs.

For example, donors may want to be able to easily input their donation information, such as the type of food and quantity, while recipients may want to be able to easily request food and specify their dietary requirements. Food banks or charities may require additional information, such as the location and timing of donations, to ensure that the food can be distributed efficiently.

Step 2: Design the User Interface

The user interface is an important aspect of the food donation delivery application solution as it determines how users will interact with the application. It is important to design a simple and intuitive interface that is easy to use for both donors and recipients. The interface should be designed with the needs of the stakeholders in mind and should be visually appealing.

For example, the interface for donors may include fields for entering information about the type and quantity of food, while the interface for recipients may include fields for specifying dietary requirements and preferred delivery times. The interface for food banks or charities may include a dashboard that displays the location and quantity of available donations, as well as tools for managing distribution.

Step 3: Create a Database

Creating a database is an important aspect of the food donation delivery application solution as it allows you to store and manage information about donors, recipients, and donations. The database should be designed to support the needs of the stakeholders and should be secure and scalable.

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For example, the database may include tables for storing information about donors, such as their contact information and the type and quantity of food they have donated. It may also include tables for storing information about recipients, such as their contact information and dietary requirements. Finally, it may include tables for storing information about donations, such as the location and timing of the donation.

Step 4: Design the User Interface

The user interface (UI) is an important aspect of any application, as it directly impacts the user experience. The UI should be designed with the needs of the stakeholders in mind and should be intuitive, easy to use, and aesthetically pleasing.

For example, the donor interface may include a simple form for entering donation information, while the driver interface may include a map for navigating to delivery locations.

Step 5: Define the Data Model and Architecture

The data model and architecture of the application will define how data is stored, accessed, and processed. It is important to design a data model and architecture that is scalable, secure, and efficient.

For example, the data model may include tables for donors, donations, drivers, and deliveries, while the architecture may be designed to handle high volumes of data and users.

Step 6: Implement Security Measures

Security is an important consideration in any application, but particularly in food donation delivery application solutions. These applications may handle sensitive information such as personal information or payment information, so it is important to implement measures to protect against common security threats such as SQL injection and cross-site scripting attacks.

For example, secure login measures may include two-factor authentication, such as sending a verification code to the user's phone, or using biometric authentication, such as a fingerprint scanner. Encryption measures may include encrypting sensitive data such as credit card numbers or personal information. Protection against SQL injection and cross-site scripting attacks may involve using parameterized queries or input validation to prevent malicious code from being injected into the application.

Additionally, other security measures may include implementing firewalls, using SSL/TLS encryption for secure data transfer, and regularly updating software and security protocols to address new threats and vulnerabilities.

Step 7: Test and Debug the Application

The app is tested and fixed to make sure it works as expected, and bugs are found and fixed before they are made available to the general public. These are important steps in the development process. Testing includes things like UI testing and integration testing.

Unit testing is the process of testing individual parts to make sure they work as intended. For the system's connection, measuring the connection between these devices is crucial. The process of testing an application's functionality and compatibility with real users is known as user verification.

Debugging involves identifying and fixing any issues or bugs that are identified during testing. This may involve analyzing log files, error messages, and other data to identify the source of the problem and implementing a solution.

Step 8: Deploy the Application

Once the application has been developed, tested, and debugged, it can be deployed to production. Deployment involves setting up the application on a server or other hosting environment and configuring it for use by stakeholders.

Deployment may involve setting up databases, configuring web servers and application servers, and ensuring that the necessary security measures are in place. Once the application is deployed, ongoing maintenance and monitoring will be necessary to ensure that it continues to function as intended and that any issues are addressed in a timely manner.

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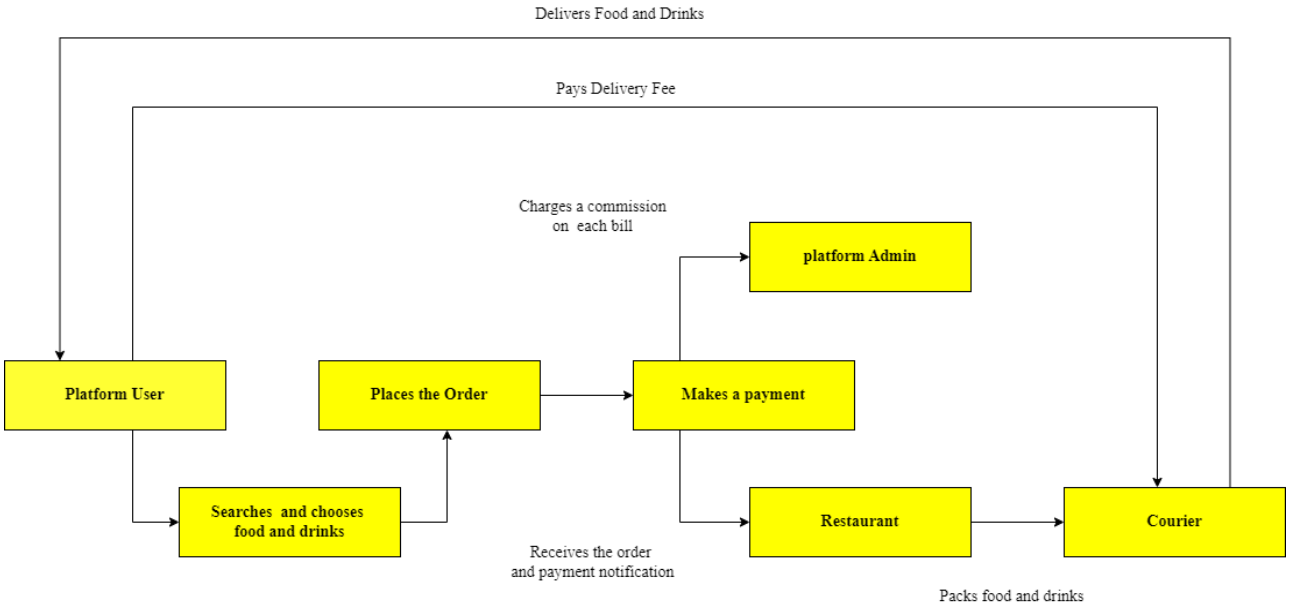

Fig.3. Food Delivery Business Model

CONCLUSION

This study's assistance in identifying some of the factors that contribute to the malnutrition of their families will be beneficial to women who continue to live in India despite improvements in other indicators. Due to the adaptability of the internet and mobile phone use, food delivery services are on the rise. Food delivery services make it simpler for businesses to acquire new customers, and people also save a significant amount of time when placing food orders online. Food conveyance applications also help restaurants better serve their customers by providing individualized insight into the issues and assumptions of additional customers. Consequently, the restaurant ought to decide whether to create and distribute a food delivery application.

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