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BRIDGING THE GAP: EARLY CHILDHOOD CARE FOR CLIMATE REFUGEE CHILDREN (0-6 YEARS) OF GHORAMARA & SAGAR ISLANDS, SUNDARBAN

PREPARED BY

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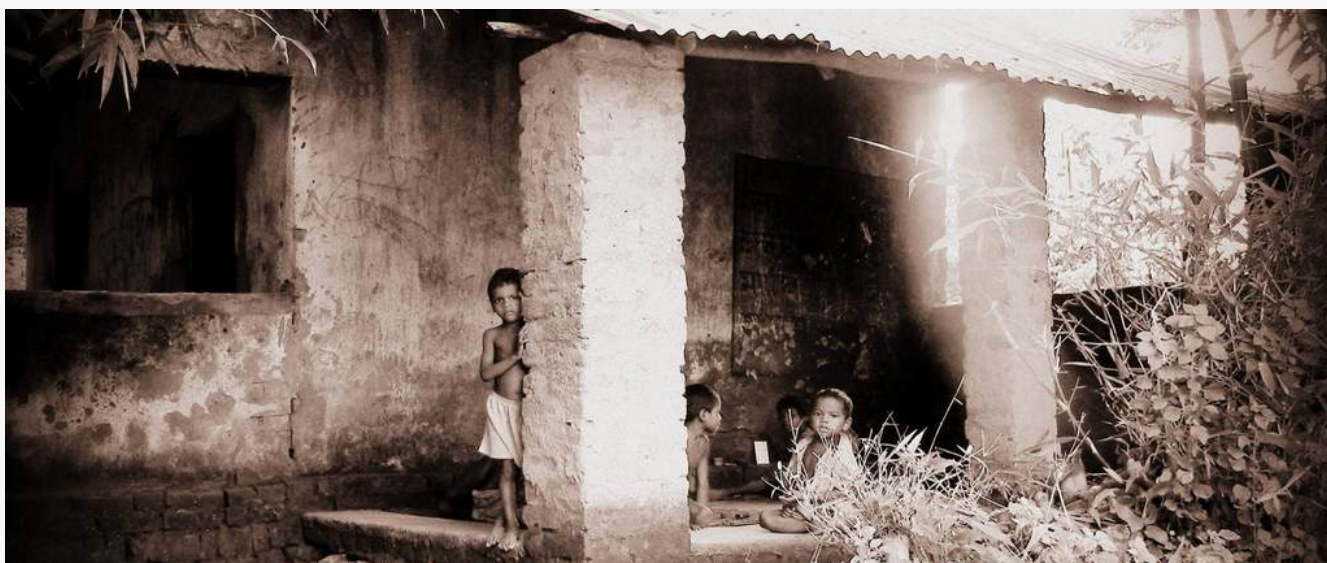


EXECUTIVE SUMMARY

This baseline study was conducted as part of SBI Foundation supported SEED's Muskaan Early Childhood Care Centres (ECCC) initiative to improve early childhood care and development outcomes for targeted children which aims to improve early childhood care and development for 100 children across two centres at Ghoramara and Sagar Islands.

Ghoramara Island is under stark and severe threat of corrosion and has even now vanished nearly 50% of its real area in preceding four decades. This led to the submergence of a wide and vast part of this island that consisted and involved agricultural land and settlement. Subsequently, having lost their land, the islanders turned into landless. Sagar Island is very much prone to coastal flooding, coastal erosion, tidal surges, embankment breaching and cyclonic impact. Thus, the livelihood patterns of these Islands have become very vulnerable through losing their own houses and lands.

The present study is an exploratory assessment with an objective to ascertain the nutritional status of the children aged two to six years and the utilization of ICDS in the Sagar and Ghoramara islands located in the Sundarbans region. Additionally, the study also aims to identify the pattern of food intakes, extent of recommended minimum dietary diversity among children and their mothers/caregivers, adherence to the recommended Infant and Young Child Feeding (IYCF) practices, sanitation and personal hygiene practices of household members, and psychological health of mothers/caregivers.



The existing literature suggest that the impacts of climatic hazards on children vary among individuals depending on the context and facilitated by a host of other socio-cultural, economic, ecological, or political factors. In this context, drawing on multiple data sources, methods, and tools, the goal of this study is to build an understanding of the impact of climatic hazards in order to inform directions of the interventions in the region to be more climate-responsive. Within a broader thematic focus on health and nutrition, the study aims to draw particular attention to child vulnerabilities through focal areas of maternal and child health care utilization.

In this regard, quantitative as well as qualitative approach can provide a distinctive lens to illuminate the origin of the study islands, the functioning of ICDS centres, vulnerability of children and their mothers/caregivers due to adverse climatic events which occur almost every year. All these aspects have been assessed through face-to-face interviews with the sampled children and their mothers/caregivers and unstructured in-depth interviews with the members of local community. This knowledge will also be crucial for informing climate change adaptation initiatives and providing a stronger foundation for protective measures.

This research highlights the precarious health and nutritional conditions of children aged two to six years residing in the coastal regions of Ghoramara and Sagar Islands in the Sundarbans. The study reveals widespread undernutrition, including high levels of stunting, wasting, underweight, and acute malnutrition as measured by mid-upper arm circumference (MUAC). The extent of Composite Index of Antropometric Failure (CIAF) is also found to be unacceptably high. These indicators point to both chronic and acute forms of nutritional deprivation affecting young children in the area.

Dietary assessments reveal inadequate intake of diverse food groups among children, with particularly low consumption of pulses, animal proteins, fruits, fortified foods, and essential micronutrient supplements. Such dietary insufficiencies contribute significantly to the poor nutritional outcomes observed and indicate a need for urgent interventions to enhance both food quality and frequency.

The functioning of Integrated Child Development Services (ICDS) in these areas is found to be limited. While daily food support is generally provided, there are serious gaps in the delivery of pre-school education, caregiver counselling, and preventive supplementation. Immunisation outreach and the distribution of vitamin A, deworming tablets, and iron-folic acid supplements remain suboptimal due to irregular visits by frontline workers, logistical constraints, supply shortages, and the geographical isolation of the islands.

Among mothers and caregivers, poor dietary diversity is a consistent concern, suggesting deep-rooted household-level nutritional insecurity. This maternal undernutrition further compounds the health risks faced by children.

The socio-demographic analysis reveals that malnutrition disproportionately affects female children, members of Scheduled Tribe communities, children of mothers with low education levels, and households facing economic hardship. These patterns point to the intersection of gender, caste, education, and poverty in exacerbating health vulnerabilities.



The findings on child and maternal nutrition in the study areas highlight urgent needs that can be strategically addressed through SEED's Muskaan's Early Childhood Care Centres (ECCCs) comprehensive intervention model supported by the SBI Foundation. The daily provision of nutritious mid-day meals should be reinforced and tailored based on the dietary gaps identified, particularly addressing deficiencies in protein, iron, and vitamin-rich foods. These meals can serve as a nutritional safety net for children from food-insecure households.

To complement the nutritional component, Muskaan's structured psychosocial support framework can be leveraged to promote responsive feeding practices and mothers/caregiver-child interactions, especially in food-scarce or crisis-affected environments like Ghoramara and Sagar Islands. Nutrition education sessions integrated within early learning and play-based curriculum can further cultivate healthy eating habits and food awareness from a young age.

Regular health check-ups and deworming initiatives should continue to be prioritized and potentially expanded, as untreated infections can significantly impact nutrient absorption and child growth outcomes. By aligning nutrition-specific findings with these broader child-focused services, Muskaan can ensure a more holistic and sustainable improvement in child health and development.

Addressing these interconnected recommendations is essential for improving the well-being and resilience of children and mothers in these ecologically and economically vulnerable coastal communities.

The study areas highlight urgent needs that can be strategically addressed through SEED's Muskaan's Early Childhood Care Centres (ECCCs) comprehensive intervention model supported by the SBI Foundation.

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CHAPTER 1-INTRODUCTION

1.1 INTRODUCTION

The Sundarbans is the tidally active deltaic complex of the rivers-Ganga, Brahmaputra and Meghna (Raha et al., 2013) which is still undergoing erosion and accretion. It is the largest wetland ecosystem in the world and provides ecosystem services ranging from carbon sequestration, oxygen production, waste recycling and trapping of sediment. The total area of Indian Sundarbans is 9630 sq. kms, out of which the reserve forest occupies about 4260 sq. kms (ibid). Currently, out of 108 islands of the Sundarban region, 54 are inhabited with 4.5 million population (ibid). Sea level rise and increase in temperature are impacting the Indian Sundarbans in greater intensities and scales than global averages. Due to locational disadvantage, Sagar block is exposed to coastal flooding, storm surges and cyclones, causing extensive erosion and salinisation (Ghosh et al., 2014).

Since the 1920s, Ghoramara Island located southwest of the Indian Sundarbans lost 70 percent of its land mass due to coastal erosion while its neighbour Lohachara Island lost to erosion in the Hooghly River in 1991(ibid). Sagar Island in the western part of Indian Sundarbans is also eroding, with a 2.18 percent rate of land loss from 2011 to 2008 (Hazra and Samanta, 2016). Land loss has been attributed to flooding, cyclones, mangrove loss and sea level rise, which may exacerbate with climate change. Global warming and consequent sea-level rise heighten tidal waves causing frequent breaches in embankments. Intrusion of saline water in agricultural land makes land unproductive for multiple seasons (Ghosh et al., 2014). Low productivity of land affects adversely lives and livelihoods.



Degradation of ecosystems due to loss of lands adversely affected the livelihoods of those dependent on natural resources. Natural resource degradation including land loss, less productivity due to salinity makes the people vulnerable and forced them to relocate to other areas and/or to migrate to other places and became 'climate refugee'. Disaster like sea-level rise related land erosion causes number of people landless and homeless and forced to live elsewhere in refugee-like situations. The hamlets near to the embankment are most vulnerable to saline water inundation and physical loss of agricultural land. Affected people are forced to shift to safer locations that are mainly inland. The value of land increases with increasing distance from the embankment. Therefore, a large number of people either live near to the embankment or at the embankment (Bera,2019).

They have to wait for government action to help them to relocate to safer locations. People of completely washed out Lohachara island and inhabitants of some parts of Ghoramara who lost their land were compelled to move towards mainlandlike Kakdwip/Namkhana or comparatively stable island like Sagar Island.

Though there is no clear records of number of displaced people but estimates suggests that about 4000 were displaced from Lohachara and Ghoramara since 1971 (Ghosh et al., 2014). Among them, 263 refugee families on Sagar Island live without access to essential resources such as drinking water, sanitation and agricultural land for livelihood. On Ghoramara Island, 356 displaced families reside in makeshift huts, deprived of even the most basic facilities (Report from SEED). In Sagar Island, people resettled in four refugee colonies such as Bankimnagar, Chalphuldubi, Jibantala and Sagar colony. Recurrent brackish water inundation forced people not to invest in agriculture. Under these circumstances, land owners are unable to monetise their asset. While such households are occupationally and sometimes physically displaced, they are in fact 'trapped' in the location.

They are unable to move away in the absence of adequate or appropriate financial and social capitals (Danda et al., 2019). There may be little interest to invest in development activities in such erosion prone land parcels from government. On the other hand, these marginalized people are not in a position to pressurise for additional support they need in such situation. The social services and infrastructural development have been broken down (ibid). The disaster caused displacement not only leads to landlessness, homelessness, joblessness but also increases food insecurity and mortality and morbidity as well as access to services (Cernea, 2004). One or more than one factors directly or indirectly affects individual health and wellbeing.

The new epigenetic research is increasingly recognized that from the time of conception and throughout the lifespan of individuals, intrasomatic, cellular environments, extra somatic environments, physical and social, together brings about transformation in human body (Lock, 2015). It puts emphasis on gene expression, not gene sequence. It examines how variation arises despite fundamentally similar genetics (Landecker and Panofsky, 2012). It recognises the importance of environmental variables such as diet, food practices, access to health care, social adversity, poverty, psychosocial stressors, climate change etc. led to biological differences in a dynamic process over time and in specific locations (Lock et al., 2021).

It on local ecologies highlights how human biological differences are diversely distributed in a heterogenous fashion even within the groups as a result of different ecologies. Since recurrent climate related hazards cause food scarcity, poor nutrition and deteriorating health care accesses and practices, mothers particularly during pregnancy and lactation as well as conception to early child care may affect immensely among the people of both Ghoramara and Sagar islanders.

It is claimed that climate refugee children particularly in the age group 0-6 years from Ghoramara and Sagar Islands face malnutrition, poor health and cognitive development, developmental delays and pre-primary educational needs are also neglected due to displacement and climate induced poverty. Hence, there is need of additional support to address food and nutritional deprivation. But there is no comprehensive study on food practices, nature of food ingested, nutritional status, nature of health care, ICDS services and utilization by mothers and children in the context of social, economic and ecological adversity in these islands. The present study attempts in this direction. The study was conducted as a part of SBI Foundation supported SEED's Muskaan Early Childhood Care Centres Initiative that aims to improve early child care and development outcomes for targeted children of two centres of Ghoramara and Sagar Islands.

1.2. CONTEXTUALISING FOOD AND NUTRITION IN MATERNAL AND CHILD HEALTH



Maternal and child health is an indicator of the overall health and well-being of a population. The World Health Organization (WHO) has set 17 goals for sustainable development, out of which the 3rd goal ensures healthy lives and promotes well-being for all at all ages. Women who remain healthy during pregnancy and after birth are more likely to stay healthy later in life and have better birth outcomes, influencing children's health from infancy to adulthood (2021).

Investing in both maternal and child health provides significant outcomes. For mothers, access to quality healthcare during pregnancy and childbirth can reduce the risk of death and complications. If mothers are healthy enough, they can take care of their children and also contribute to their families and communities. For children, access to quality healthcare can help prevent and treat diseases and ensure that they reach their full potential (Nepal et al., 2020). Most important ways to invest in maternal and child health ranges from expansion of health care, investment in nutrition and educational programmes as well as investment in social safety networks.

Expanding health care ensures healthy lives and promotes well-being by reducing maternal mortality, and end of preventable deaths of new-borns and children under-five years of age. This helps to improve the overall health of the population and contributes to increased life expectancy, which is a crucial indicator of human development. Similarly, nutritional programmes provide direct access to nutritious food and education on proper nutrition to mothers and children. Nutritious food improves health of mothers particularly during pregnancy and lactation and thereby gives the best care to their children, and healthy children are more likely to reach their full potential.

A healthy child is often seen as the productive asset to the economy as well as the nation. An optimal healthy child does not mean only achieving the physical growth and motor skill but also attaining neurological, psychological, emotional, and social development (Chowdhury, 2019). If mothers and children are healthy, they may be better equipped to withstand and recover from disasters and emergencies. So, investment on mother and child health is necessary so we can strengthen the communities and reduce their vulnerability to health crises. Furthermore, these programmes help to break the cycle of malnutrition, which ultimately breaks the cycle of poverty because well-nourished and educated children are more likely to break the cycle of poverty and contribute positively to their communities and nations.

Nutrition is fundamental to human health and development and child malnutrition is a public health problem with major consequences for child survival, damaging the cognitive and physical development of children and the economic productivity of individuals and societies. Malnutrition in children is represented by under-nutrition, characterized by stunting, wasting, underweight, micronutrient deficiencies including iron deficiency, anaemia as well as over-nutrition manifested as over-weight and obesity. Though food is important source of nutrition, food insecurity has been on the rise, experiencing a surge since 2019 from 135 million to 345 million individuals. According to FAO, “food security exists when people at all times, have physical and economic access to sufficient, safe and nutritious foods that meets their dietary needs and food preferences for an active and healthy life”. Hence, lack of physical and economic access renders a person food insecure. Forced displacement of people significantly hinders their access to important resources including healthy and diverse foods that negatively affect their nutritional status and overall health and wellbeing. Studies revealed that food insecurity is prevalent among the internally displaced persons (IDPs) who have been forced to leave their habitat due to conflict, natural disasters, warfare, violence etc. It affects the nutritional status of children under five mostly.

A study among the IDP households revealed a high prevalence of food insecurity, with about 98 % of households experiencing some degree of insecurity. Among the children, more than half were stunted, over a third were underweight, and 16% were wasted, indicating severe nutritional deficiencies (Matuge et al., 2025). On the other hand, 28.4% were overweight or obese, while a significant number were underweight. High prevalence of food insecurity among IDP households force families to adopt coping strategies, mainly through dietary modifications, contributing low dietary diversity and poor nutritional status, with children suffering from underweight, wasting and stunting (ibid). Lack of money, absence of variety in diets, poor access to nutritious foods causes food insecurity among the IDPs. These people most often lack money to get foods rich in essential nutrients due to high levels of poverty, as they forced to abandon all sources of livelihood in search secured locations (Matuge et al., 2025). Poor diets in early childhood can lead to deficiencies in essential vitamins and nutrients –such as vitamin A deficiency, which weakens children’s immunity, increases their risk of blindness and can lead to death from common childhood diseases like diarrhea.

Meeting children’s nutrient needs in early life can be challenging, and many parents face barriers to securing enough nutritious, safe, affordable, and age-appropriate food for their children. These challenges are even greater during conflicts, disasters, and other humanitarian crises. In addition to food insecurity, forced displaces face challenges like lack of shelter, unavailability of clean water and sanitation, poor infrastructure of healthcare services, unavailability of birth attendants and healthcare professionals. All these lead to sudden rise of maternal and child mortality and morbidity, psychological stress, altered family roles, displaced parenting, and vulnerability to exploitation (Hirani and Richter, 2019).

Displacement also led to other health issues like mental problems, alcohol consumption, peri-natal outcomes. Studies have shown that long term effects of stress due to displacement increases the likelihood of ischaemic heart disease. Additionally, poor integration of displaced populations in host society (e.g. marginalization and lower socioeconomic status compared to host) can lead to a ‘cumulative disadvantage’ causing negative effects on health outcomes (Cuadrado et al., 2023). In other way, food insecurity could serve barrier for getting nutritious foods that would adversely affect maternal and child body leading to diverse health outcomes. It further exacerbates during forced displacement due to extreme weather events.

The postgenomic knowledge helps to recognise multiplicities of nature/nurture and declare that body not to be conceptualised as a clearly bounded predetermined entity from the time of conception to throughout life course of individual. It should be conceptualised as situated in time and space, and thereby allows recognition of the way in which environmental, historical, political, and socio-cultural factors influencing representations of body (Lock and Nguyen, 2010). The body is biosocial throughout from the beginning. According to Niewohner, this body “heavily impregnated by its own past and by the social and material environment within which it dwells. It is a body that is imprinted by evolutionary and transgenerational time, by ‘early life’ and a body that is highly susceptible to changes in its social and material environment” (2011, p. 289). Hence, ‘local biologies’ is important to understand the diversities of health and wellbeing. It contested the notion of universal human biology and focuses on how environmental variables such as diet, access to health care, toxic exposures, psychosocial stressors, climate change etc. give rise to biological diversity in a dynamic process over time and in specific locations (Lock et al., 2021).

The concept, like ‘epigenetics’ in biology help us to reveal the complex interplay between genetics, life course, and environments in the embodiment of human experiences. The study of epigenetic marks examines how non-genetic factors can influence gene expression. In other way, it does not examine how genetic variation causes bodily variation, rather how variation arises despite fundamentally similar genetics (Landecker and Panofsky, 2013). Variation occurs due to a diverse environmental exposers like psychosocial stress, food, toxic chemicals etc. In environmental epigenetics, study explores how physical environments (i.e. toxins, pollution, and green space), social environments (i.e. adversity, stress, trauma, malnutrition and poverty) and other external factors directly influence a number of epigenetic mechanisms (Lock et al., 2021). This environmental experience in one generation may alter biology, behaviour, and health in the next (Thayer and Non, 2015). Since epigenetic marks are sensitive to environmental exposure throughout growth and development, they represent prime mechanism underlying development plasticity (Thayer and Non, 2015).

It is well established that prenatal exposure to maternal stress, anxiety, and depression can have permanent effect on infant development. Environmentally induced epigenetic marks are associated with behavioural outcomes pre-and post-natally (Lock, 2015). Environmental conditions influence the molecular activity inside the uterus and its fetal contents. For instance, a case study on fetal environment as object of study in connection with pregnant women affected by the so-called Dutch Hunger Winter is to be stated. Thirty thousand people died from starvation due to food embargo imposed by the German in World War II leading to complete breakdown of local food supplies.

Studying local birth records revealed that children born of ww women who were pregnant during the famine not only had low birth weights but also showed a disproportionately high range of developmental and disorder in adult life like diabetes, heart disease and cancer (Lock, 2015). Food is understood as an epigenetic factor that functions in regulation of gene expression, causing several disorders like diabetes, obesity, cancer. For Landecker (2011), food enters the body and never leaves it, and what is taking place is “a very specific form of naturalization of social change that recasts suffering as molecularly heritable, the past borne forward into the future via a metabolic interface”. Food is a form of environmental exposure enters into the body and undergoes metabolism and helps in growth and development of individuals. Food of deficient nutritive value as well as condition of food scarcity in hazardous environments doubly hampers bodily growth and development.

Most of the under-five children suffer from the under-nutrition, which is now critical global health problem. Poor nutritional intake by children leads to long lasting adverse consequences not only for their health but also for the economy. Economy faces the inter- generational malnutrition and the diminishing economic productivity (Chowdhury et al., 2019). Malnutrition is the imbalance of energy, protein and micro nutrient (Grover, 2009; Das, 2009). The main indicators are underweight, stunting and wasting. During the child’s growth period if a child is suffering from long lasting food deprivation, the key organs like heart, kidney, thymus, and muscles reduces in size except the brain. Fat stores which are used for energy, reduces the muscle mass and that leads to rise the mortality or long-term health consequences. Those with better muscle mass have a better survival rate against infection. Because brain demands a large proportion of glucose which is derived from amino acids, and that derived from muscle, so, lower muscle mass leads to lower survival rate though children have lower muscle mass than adults. The muscle wasting is commonly seen in the malnourished children and it is highly associated with the risk of death because reduction in the muscle tissue adversely affects the human immune system. The anthropometric index, wasting is one of the determinants of muscle mass deterioration since increased mortality is seen mostly in wasting syndromes (Rivera, 2003; Chowdhury et al., 2019; Grover, 2009).

Micronutrient deficiency and loss of muscle mass play a critical role in a child's development and survival. Every child as well as mother suffering from micronutrient deficiencies because 70% of energy intake diet is based on the cereals like maize, wheat and rice and does not consider the essentials source of micronutrients, which comes from the animal protein like meat, dairy, eggs etc. There is only 12% protein in the 60%-70% total energy intake.

In this type of diets micronutrient density is very much low. Without enough iron, zinc and calcium in the diet, individuals are at increased risk of anemia, impaired growth, and development delays. The first six months after the birth a mother should provide exclusive breastfeeding. If a child is deficient in vital micronutrients, their growth rate may lag behind the normal growth curve (Chowdhury et al, 2019; Rivera, 2003). A child's linear growth mostly depends on two things- one is genetic endowment and the other one is nutrition, the absorption of micro and macro nutrients (Chowdhury et al., 2019). The four most widespread forms of micronutrient malnutrition are iron, vitamin A, iodine and zinc deficiencies (Ahmed, 2012). Micronutrient deficiencies impact a child's growth adversely and it has been seen significantly in low-income countries. More than half of the preschool children are anemic and suffers from vitamin A deficiency. Even half of the world's population is suffering from inadequate intake of absorbable zinc (Rivera, 2003).

Out of two million global anemia cases, iron deficiency alone cause 50% of them. Due to low intake of meat, fish, and poultry, iron deficiency is seen in both children and mother and they suffer from severe anaemia (Rivera, 2003). Anaemia causes various infectious diseases like malaria, hook-worm infection, schistosomiasis, and tuberculosis. Iron deficiency also reduces the cognitive performance, lower working efficiency (Ahmed, 2012). Some of the iron supplementation trials to the anemic infants and young children showed that not only the likelihood of morbidity is reduced among them but also iron supplementation improved their physical growth. Many studies found the evidence that the preschool children who were significantly anemic gained more weight and height by taking proper iron supplementation. This supplement also helps to increase hemoglobin concentration. But no effect is shown in case of non-anemic children (Rivera, 2003).

Most of the clinical trials provided evidences that vitamin A doses reduce child mortality. Out of nine studies two studies which did not use placebo group of control trial showed that there was positive effect on child's growth mainly in increasing height and weight. A study conducted in Sudan showed that only girl child who were aged between one to three years gained weight. There was no effect on boys. The study conducted in Tanzania only showcased the modifying factors. Children with pneumonia who receive vitamin A doses over eight months showed no improvement. But there was a definite positive impact on linear growth of children who were from low socio-economic status and children with HIV infection. The risk of stunting was low to those who receive vitamin A doses than those with poor water supply. It was observed that the infants who were exclusively breastfed for four to six months (but not less than four months) had lower risk of stunting syndrome.

Therefore, overall studies showed that there is no growth improvement in case of mild to moderate vitamin A deficiency while growth benefit of vitamin A doses ensure in case of severe deficiency to the low socio-economic status. Vitamin A supplement generally does not help to gain height or weight (Rivera, 2003; Sommer, 1997). Although long term deficiency of vitamin A due to low intake of dairy products, eggs, fresh fruits and vegetables can cause xerophthalmia which is nothing but the childhood blindness (Ahmed, 2012).

To address differential nutritional deficiencies, an intervention program offered milk and cereal based supplements plus nutrition counseling to the infants at four months of age for the time of eight months in India. Children of treatment group are observed weight increment than control group. But children are suffering from diarrhea due to contaminated water which is used to dilute the food supplements. Therefore, increasing nutritional intake with improved water quality may prevent the morbidity and associated growth faltering (Rivera, 2003; Mukherjee, 2016).

A child's health also depends on his or her mother. Maternal short body height and low body mass index give an adverse effect on child's birth weight or physical condition. Maternal and child under-nutrition leads to morbidity, mortality, or disability in a short-term process but in a long-term there would be lower cognitive development, physical growth, problem in the reproduction, and it may also lead to some chronic metabolic and cardiovascular diseases (Black, 2008; Ahmed, 2012). There was a significant inverse relationship between socio-economic class and underweight and stunting (Abdullah, 2023). The nutritional level of a child was associated with exclusively breast feeding, starting age of complementary feeding, and the total duration of breast feeding. Children breastfed for less than six months were basically underweighted and wasted. Duration of breastfeeding had an inverse relation with the underweight and wasting but not with the stunting. The study also found that the starting age of complementary feeding had a significant association with underweight and stunting. Therefore, to prevent the stunting, wasting, underweight proper counselling for mothers should be promoted and practiced for the development of nutritional status of children (Abdullah, 2023).

India government has taken initiation of various health programs from time to time. But most of them did not reach out properly to the community (Sachdev, 2001). In 1974, India adopted a holistic multi-centric program with a composite of services. The scheme was launched on 2nd October, 1975 in 33 blocks. The main objective of the scheme is to improve the health and nutritional status of children between 0-6 years and pregnant and lactating mother (Sachdev, 2001; Debata, 2023).

The main components of ICDS Scheme are Early Childhood Care Education and Development, care and nutrition counseling, providing basic health services, community awareness, advocacy and IEC. Under this umbrella scheme the services mainly supplementary nutrition, preschool education, nutrition and health education, growth monitoring of child, immunization, basic health check-ups and referral services offer to the beneficiaries (Singh, 2024).

ICDS committed to the children for meeting the entire requirement to break the vicious cycle of malnutrition, morbidity, and mortality (Joshi, 2018). All the ICDS services are provided by Anganwadi worker (AWW) and Anganwadi helper. Each Anganwadi covers a population of 1000 persons (Debata, 2023). The main objective of the AWC was to provide the supplementary nutrition to the children whose age between 6 months to 59 months. The less time they engaged in providing the preschool education to the children. Average working time was less than that of ideal (Singh, 2013). Beneficiaries including children and pregnant mother were mostly happy with the proper supplements but lactating mothers were dissatisfied. Most of the AWWs did not get any training on the Integrated Management of Neonatal and Children Illness (Meena, 2017). Senger (2022) revealed that to increase the efficacy of AWCs either workload of AWW should be reduced or percentage of beneficiaries receiving supplementary nutrition and health check-ups should be increased. The inefficient AWCs were lacking in inputs especially in logistic supplies and poor infrastructure - the main constraint of efficiency process. Therefore, an improvement of the input variables i.e. the infrastructure and logistics can improve the performance of AWCs.

The literature review on climate change and child health shows that temperature variations, rainfall, floods, and droughts may directly change crop yields, thus causing malnutrition (Hellden et al, 2021). In addition to increased mortality, morbidity and migration, climatic extreme factors that alter ecosystems and disease vectors may also indirectly influence these outcomes. Citing agriculture based rural households in Bangladesh, Ahmed and others (2012) noted that if yield in cultivating land and from fisheries is at risk, reduced output may lead to nutritional deficiencies for vulnerable individuals, particularly serious health implications to child and young. Moreover, resulting income declines may affect women's agency, dietary quality and assets (Quisumbing et al, 2021). There were a large number of children in disaster prone districts who were weighed less at birth and the mother who were lacking in knowledge in breastfeeding practices implying a higher level of malnutrition and morbidity of their children. One of the reasons of this could be the pregnant and lactating mothers could not attend the village health and nutrition days and obtain the knowledge of breastfeeding practices during the disasters.

Cyclones were the main constraint of providing proper nutrition services when AWCs were damaged due to disaster and also disruption of home visits by AWWs, leading to irregularities of academic sessions (Mukherjee, 2020).

Vulnerability due to climate change over the undernutrition is quite common in the Sundarbans, a deltaic region in the districts of North & South 24 Parganas of West Bengal. IIHMR's extensive research on the health of the Sundarbans population, conducted under the Future Health System Research Programme Consortium, has recorded various challenges pertaining to maternal and child health. According to the FSH-IIHMR (2010) study, about one-third of the children suffer from chronic malnutrition. Malnutrition is particularly common in girls between the ages of 13 and 36 months who belong to lower-income families. They are more vulnerably nourished than the boys (Mukherjee, 2016; Kanjilal, 2010). According to the Sundarbans Health Watch Report (IIHMR), more than 35% of children (0-5 years) are stunted and 39% are underweight.

The figures exceed national and state averages, underscoring the severe nutritional crisis among children. The report identified six administrative blocks as the most vulnerable in terms of service delivery gaps and physical inaccessibility. The proportion of chronically malnourished children is 52%, which is much higher than both the state (45%) and national (48%) averages at the point of time. One-third of mothers are underweight, impacting foetal growth and increasing low birth weight (LBW) prevalence. It also mentions the good correlation between mothers' health and the nutritional status of their children. Compared to moms of children of normal weight, mothers of children with SAM and MAM suffer from greater levels of malnutrition.

In addition to hunger, children in the Sundarbans experience an increased burden of illness, a higher hospitalization rate, and a worse immunity due to the incidence of respiratory infections or gastrointestinal diseases. In the settlements of the Sundarbans, there is a clear lack of adequate sanitation and hygiene, which gets worse during floods (Kanjilal et al., 2010). Similar findings were found in a more recent study by Panda et al. (2016), which found that the high frequency of common communicable diseases and unacceptable levels of undernutrition make the Sundarbans children particularly vulnerable. The most common diseases prevalent among children are respiratory ailments (fever, cough), gastrointestinal disorders (diarrhoea, watery stool) and skin problems (irritation, rash).

According to Bose et al. (2016), one of the factors influencing mother and child health is climate change, which has an impact on mortality as well as other medical and mental health conditions. Numerous studies (for instance, Helldén et al., 2021) and clinical trials are cited in this review to acknowledge that climate change-induced threats, such as frequent storm surges, flooding, and salinization (Dasgupta et al., 2020), have a negative impact on reproductive and child health, mental health, rights, and wellbeing through a variety of mechanisms. According to the Sundarbans Health Watch report one third of the under five children are malnourished. Child's health is devastated during the climatic shock (Kanjilal, 2010). Children are suffering from various infection diseases like diarrhea, gastrointestinal disease. Poor hygiene, polluted water increases the morbidity rate. During the cyclone source of drinking water is contaminated; agricultural land is affected by salt water. As the production falls, food becomes sparse.

Therefore, inhabitants fail to take two times meal in a day (Mukherjee, 2016; Kanjilal, 2010). Increasing frequency and exposure to tropical cyclones have adverse health outcomes – such as cardiovascular diseases, water-borne diseases, respiratory diseases, dialysis, and injury-related hospitalizations. According to a community-based assessment by the Child in Need Institute (CINI) and the George Institute, flooding also raises the risk of drowning mortality for children aged one to nine years. According to Kanjilal et al. (2010), who studied the 2009 Cyclone Aila's effects on the Indian Sundarbans, the most significant short-term health risks caused by the storm were water-borne illnesses. Additionally, Lieberman (2020) details how the salinization of the land and the notable storm surge during Cyclone Amphan (2020) led to an increase in paediatric eye infections. Snakebite-related illnesses are very common, especially after cyclonic events (Chowdhury and Jadhav, 2012).

There is growing concern about health problems among women and children in the Sundarbans regions due to increased water insecurity. For example, recent World Bank research by Dasgupta et al. (2020) found that progressive salinization of rivers and groundwater has resulted in a loss in available fresh drinking water in the deltaic region. It also reveals that persistent maternal-child health concerns in the Sundarbans, such as dehydration, hypertension, prenatal difficulties, increased new born mortality, and preeclampsia, are strongly associated with increased salt intake through drinking water. In other locations, women spend long hours in saltwater water catching shrimp larvae and crabs, causing serious health issues, particularly skin diseases and discoloration (Chakraborty, 2020; Dasgupta et al., 2020).

The rising frequency of natural disasters endangers not just the physiological health of island residents, but also their mental health, including that of their children. For example, Chowdhury and Jadhav (2012) claim that the region's eco-specificity is inextricably tied to the population's mental health, as the frequency of tropical cyclones and related flooding increases, making individuals more nervous and emotionally affected. Deliberate Self Harm (DSH) attempts occur over 1800 times each year in the Indian Sundarbans region, with women being particularly vulnerable.

Some studies observed that the service provided by the AWW is not good enough in the Sundarbans region. They discriminate between beneficiaries; provide poor quality of supplementary nutrition. Most of the AWW visit the children who suffer from gastrointestinal morbidity once in a week or twice in a month (Mukherjee, 2016; Kanjilal, 2013). The health infrastructure is already inadequate, and climatic shocks such as cyclones make it even more inaccessible to the local people, depriving impacted islanders of quality- assured medical assistance (Kanjilal et al., 2013, Bose et al., 2018). According to reports, Cyclone Amphan, which slammed India's Sundarbans region in 2020, damaged around 563 basic health care centers in West Bengal. As a result, access to routine health and visual care services decreased immediately.

Educational & Cognitive Development Deficiencies (ECDD) are also seen among the children of the Sundarbans region. Only 45% of children aged three-six years are enrolled in pre-primary education, limiting school readiness. While 75% of eligible children are registered with ICDS, only 8% receive meals regularly and 61% of three-six-year-olds do not attend AWCs consistently. Children in the three-six age-group lack home-based learning interventions, reducing their language and social skill development.

The Sundarbans experience four to eight cyclones annually, with many families losing homes, farmlands, and livelihoods. Children face trauma, displacement and anxiety, impacting their psychosocial development. Teen marriages and low maternal education (34% illiterate) result in poor childcare practices. Girls (one-three years) from poor families are at 60% risk of chronic malnutrition, reinforcing gender inequality. Lack of safe play spaces and structured group activities impairs social-emotional learning in young children.

As stated earlier, the impacts of sea level rise in combination with complex hydrodynamic conditions, have caused severe coastal erosion of Sundarbans Islands. Ghoramara and Sagar islands affected severely due to sea-level rise and subsequent erosion. Due to erosion of some parts of Ghoramara and Sagar Islands people are forced leave those habitats and relocated to other areas and staying as refugee like situations. Sea-level rise heightens tidal waves causing frequent breaches in embankments. Intrusion of saline water in agricultural land makes land unproductive for multiple seasons (Ghosh et al., 2014). Low productivity of land affects adversely lives and livelihoods. People in these islands became food insecure. Due to continuous flood and inundation, food diversity becomes limited. Forced displacement of people due to land loss and ecosystem services significantly hinders their access to important resources including healthy and diverse foods that negatively affect their nutritional status and overall health and wellbeing. Poor dietary variety and reliance on low nutritive foods worsen malnutrition and harm ecosystems through unsustainable food production. It also limits the intake of essential vitamins and minerals required for body growth and development.

People living on such disaster-prone areas need special intervention particularly for mother and child and thus invite assessment of current status of food habits and practices, nature of food ingested, nutritional status, psychosocial stress of mother and children, access to health care and functioning of the ICDS. The general objective of the present study is to find out general health status, nutritional status, utilization of ICDS, dietary habits, and morbidity pattern of the selected children in Ghoramara and Sagar Islands. The study also tried to assess the nutritional status, dietary habits, and psychological health of the mothers/caregivers of the selected children.

People in these islands became food insecure. Due to continuous flood and inundation, food diversity becomes limited. Forced displacement of people due to land loss and ecosystem services significantly hinders their access to important resources including healthy and diverse foods that negatively affect their nutritional status and overall health and wellbeing. Poor dietary variety and reliance on low nutritive foods worsen malnutrition and harm ecosystems through unsustainable food production. It also limits the intake of essential vitamins and minerals required for body growth and development.

1.3. OBJECTIVES OF THE STUDY

The aim of this study is to improve early childhood care and development outcomes for targeted children across two centres in Ghoramara and Sagar Islands. This study has been done as a part of SBI Foundation supported SEED's Muskaan Early Childhood Care Centres Initiative. The objectives are:

- Asses the demographic and socio-economic profile of children in the climate-affected regions like Ghoramara and Sagar Islands.
- Investigate the health conditions and nutritional levels of the children aged two to six years.
- Identify the pattern of food intakes and minimum dietary diversity among children and their mothers/caregivers.
- Assess the status of early childhood care services provided by ICDS for the children aged 2–6 years in Ghoramara and Sagar Islands.
- Understand the sanitation and personal hygiene practices of household members, and psychological health of mothers/caregivers.
- Investigate the challenges children face and identify the gaps in nutrition, health, safety, psychosocial development, and education among two to six years old children in displaced or at-risk households.
- Estimate the level of depression, anxiety and stress among children in this climatically vulnerable environment..
- Understand coping mechanisms of families, communities, and frontline workers in supporting children during climate shocks.
- Recommend context-specific, child-centered strategies for early childhood care to strengthen early childhood services and climate resilience.

1.4. RESEARCH QUESTIONS

A. Early Childhood Care and Development

1. What is the status of early childhood care and development services (health, nutrition, pre-school) available to children aged two to six years?
2. How many children have access to ICDS/Anganwadi (AWW) services, and what is the quality of those services?
3. What are the feeding practices, nutritional status, and growth patterns of these children?

B. Impact on Food Security and Nutrition

1. How do these climatic hazards affect food availability in the households?
2. Have there been times when children had to reduce the number or size of meals due to such events?
3. Have daily food habits changed in the households because of climatic shocks?
4. Do the households suffer from crisis of drinking water? If yes, how do the households manage it?
5. During and after climatic events, do mothers/caregivers notice changes in their or their child's health or nutrition? What are they?
6. What are some of the challenges mothers/caregivers face in feeding themselves and their children during these times?
7. How does the pre-primary learning process of the children get affected?

C. Practices of Maternal healthcare during disaster

1. How is maternal healthcare provided during the episode of a disaster?
2. What preparation do expectant mothers take at the time of a disaster?
3. Where do mothers/caregivers go during maternal complications, and how?
4. What is the psychological health status of mothers/caregivers living in constant risk of displacement due to climate vulnerability?

D. Access to health and Nutrition Services

1. Are health services and food aid easily accessible during and after such events?
2. Have mothers/caregivers and their children received any help (like supplementary food, health check-ups) during climatic shocks?
3. What do mothers/caregivers think about the effectiveness of these services?

E. Climate Risks and Resilience

1. How frequently are children and families exposed to climate events (floods, cyclones, erosion), and what are the typical impacts on child health and safety?
2. How do climate events disrupt childcare services (AWW, immunization, health check-ups, pre-primary education)?
3. What are the challenges for maternal care during a disaster?
4. What coping mechanisms (e.g., relocation, temporary shelters, community help) do families use to protect children during and after disasters?
5. Are there any local NGOs, government programs or community initiative help these vulnerable sections of the society?

F. Recommendations

1. What kind of help would make things better for mother and children here?
2. What are the needs during and after climatic disasters?
3. What is the necessity of SEED's Muskaan Early Childhood Initiative supported by SBI Foundation?

CHAPTER 2- SETTING THE CONTEXT

2.1 INTRODUCTION

The study was carried out in two islands, namely Ghoramara and the Sagar islands.

Three villages, namely, Raypara, Bagpara and Khasimara were selected in Ghoramara Island, while two moujas, namely, Radhakrisnapur and Bahir Plot were selected in the Rudranagar Gram Panchayat of Sagar Island.

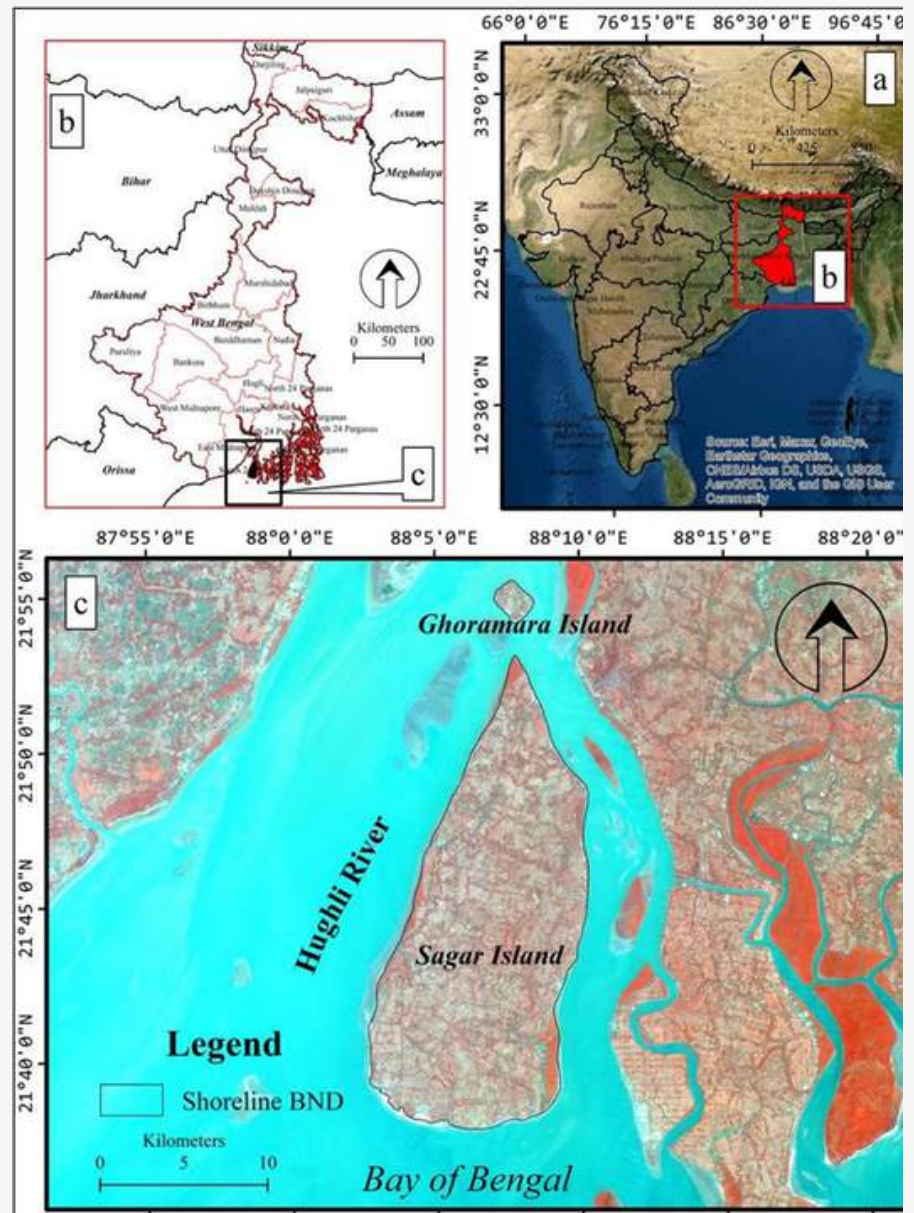


Figure 2.1 Map of Study areas- Ghoramara and Sagar Islands

2.2 STUDY AREA

2.2.1. ISOLATED ISLAND- GHORAMARA

Ghoramara Island is one of the most underserved and vulnerable regions in the Sundarbans, heavily impacted by environmental degradation and climate change. For the rising sea levels, high tides and floods have been swallowing a part of portions of the island. Ghoramara was joined to Sagar until 1903-04 and then separated from the bigger island in 1904-'05 (Bandyopadhyay, 1997). Only one or two mechanized boats, covering a 5.5 km stretch connects Ghoramara to the mainland (Kakdwip). The island has experienced significant land loss over the years, and several parts of the island have been submerged. As per a report of The Indian Express in 2015, the island, also mentioned to as the “sinking island”, “was spread over 22,000 bighas” but now it has been “reduced to approximately 5,000 bighas”. During the field, one of our key informant also mentioned that the Ghoramara area was spread over 29,000 bighas in 1947, but now it is only 2900 bighas. For this the outcome is such that there is actually an opportunity or possibility that the island may be vanished off, wiped off of the map in early and very soon.

Ghoramara’s principal villages include Baishnabpara, Baghpara, Raypara, Mandirtala, Chunpuri, and Khasimara. There were three mouzas namely Lohachara, Khasimara and Ghoramara in this Island and comprised a population of 25000 few years back. Presently, Lohachara and Khasimara is submerged (Hazra et al., 2010) completely under water. Only Ghoramara is left. The area reduced from 9.09 square kilometres in 1972 to just 3.56 square kilometres in 2015. In last three decades the resulting in severe land loss on its north-east- coast. The island’s dwindling landmass has displaced hundreds of families and forced many residents into extreme poverty. These environmental refugees were shifted to resettlement colony Phuldubi, in the year 1964. After that Kamalpur Jibantala resettlement colony started in 1972. Research conducted by Ghosh et.al. (2014) has indicated how the submergence of the villages of Khasimara, Khasimara Char, Lakshmi-Narayanpur, Bagpara and Baishnabpara of Ghorama island has led to people migrating to neighbouring Sagar Island. From the in depth interview, we have known that 33 families were shifted to Dakshin Haradhanpur at Sagar island last year.

In the absence of Government records on number of displaces caused by erosion and flooding, one estimate suggests that about 4000 persons were displaced from submerged Lohachara and five affected villages of Ghoramara Island (Ghosh et al., 2014). In 1977, new Left Front Government came to power and introduced long-term relocation plan of Lohachara and Ghoramara Islands inhabitants to Sagar Island due to its proximity and availability of land for resettlement (Mortreux et al.,2018).

Administratively, it is under same jurisdiction. The relocation process was not smooth for displaces from Ghoramara. The land allotted was not fit for cultivation for salinity in the initial period. Host communities forcefully captured some lands meant for relocation. The amount of land allotted is much less than what they had owned in Ghoramara (Danda et al., 2019). This resettlement programme was continued till the government land available in Sagar Island and thereby helps to establish new government's legitimacy. In later period, displacement occurred in Beguakhali in Sagar due to repeated embankment breaching since Aila 2009 causing reduced embankment stability (Irrigation and Waterways Department 2014). Government did not take any initiative for resettlement. Instead, they focused on short-term disasterrelief and long-term investments in coastal protection infrastructure.

Table-1: Changing Area of Ghoramara Island (1972-2019)

Year	1972	1975	1979	1990	2001	2012	2015	2025
Area in Sq. Km.	9.09	8.51	7.83	5.99	5.11	4.43	3.56	Around 3.38

During the in-depth interview, we have known from one of our key informants that firstly, the Ghoramara island was covered by jungle. Few people from Kanthi, Bhagabanpur at Purba Medinipur came to this island for fishing and consequently started living there. According to traditional stories, an Englishman's horse was killed by a tiger on the well-known and a famous island in Sundarbans delta. Thus, it was named the island of 'Ghoramara' (literally meaning 'killing a horse'). According to the 2011 population census, the Ghoramara village has a population of 5,193 people, with 2,644 men and 2,549 women.

The number of children aged 0 to 6 in Ghoramara village was 694, accounting for 13.36% of the total population. Now, among the 5,570 residents and 1,150 households in Ghoramara Island, 300 landless households are currently residing in makeshift huts, lacking access to basic amenities, further exacerbating the risks faced by children. Currently, over 60% of the population faces economic instability caused by saltwater intrusion, frequent crop failures and declining fishing stocks, with many families surviving on incomes below rupees 1,500 per month. So, many youths migrated to Kerala and work in the garden of cardamom. Some villagers also migrated to Gujrat and worked as daily labourers.

Ghoramara Island has four primary schools, one Sishu Siksha Kendra, ten ICDS centres and one high school. Among ten ICDS centre, five ICDS have their own building, but rest works from the primary school premises.

Agriculture is the most important economic activity here. Major crops are paddy and betel vines and other vegetable crops of tomato, potato, onion, chilli, snake gourd, brinjal etc. Yaas (2021) have struck the Ghoramara with immense destruction. The intrusion of saline water has reduced land productivity affecting the betel leaf and chilly production.

The dire living conditions, lack of stability and absence of sufficient resources expose the children to malnutrition, poor health, development delays, poor cognitive development and pre-primary school readiness gets neglected. These children, many displaced from Lohachara and other islands, require urgent support to safeguard their early childhood care.

Some residents opted to leave Ghoramara Island in search of better opportunities. Many had purchased land on the mainland and believed that migrating would provide them with improved livelihood prospects. But many of the islanders, despite facing numerous challenges, expressed a strong attachment to their motherland and cultural heritage, which motivated them to remain on the island.



Figure 2.2 Ghorama Island

2.2.2. CLIMATE-IMPACTED SAGAR ISLAND

Since the Sundarbans is an active delta, the contours of the land changes constantly through a natural process of erosion and accretion. Generally, western part of rivers are more vulnerable to erosion than the east, and the erosion is more along the sea facing shore lines where it is oblique (Mondal et al., 2020). Marginal accretion occurred in the inner estuaries, particularly along the eastern and northern margins of islands and sea facing (ibid).

Since Sagar Island is located on the south-west part of Indian Sundarbans, it is most vulnerable. Due to the behead shoreline with the funnel-shaped river mouth, the southern part experiences more damage of erosion during storm surge. On the other hand, some part in the eastern and northern parts experienced accretion due to locational advantage; due to accretion erosion processes, the coastal boundary has become more vulnerable for local inhabitants (Mondal et al., 2020). The rate of erosion increased with time. The total land lost was 64.162 sq. km. and that gained was 20.120 sq. km. in between 2000 and 2008 and thus net loss was 44 sq. km. per year in the Indian Sundarbans (CSE, 2012). There are 10 most vulnerable islands in the Sundarbans facing seaward side. Scientists argued that these are expected to lose 3 to 32 percent of their land mass by 2020 (CSE, 2012).

One prediction suggests that Sagar Island will lose at least 15 percent of its land area by 2020. The ten sea-facing islands such as Sagar, Ghoramara, Mousuni, Jambudwip accounts 69 percent of the land lost to the sea. Erosion is high in the Sagar Island with 30 sq. km area loss while accretion is marginal (Mondal et al., 2020). Land loss varies between the eastern (forested) and western (inhabited) parts of the Sundarbans. In the western part, construction of dams such as Farakka Barrage on the Ganga River increased the velocity of water in the Hooghly channel, an important causative factor of erosion. Release of massive water from various dams drained into the main Ganga-Bhagirathi-Hooghly channel in western Sundarbans led to erosion of islands including Sagar. This island has lost one fifth of its land in the last 90 years. Local Sundarbans scholaropined that incomplete construction of the Hooghly channel by Port Trust Authority is one of the reasons behind the changing water course and increase in erosion in the western part (CSE, 2012).

In order to increase the navigability of West Bengal's largest port Haldia, the port authority had plans to construct seven walls to divert the Hooghly River. However, after building three walls in 2003-04, the plan was abandoned as a new in Sagar was conceived. The local people and fisherfolk believed that these three walls increased the strengths of water currents and severe erosion (CSE, 2012). Intrusion of saline water in agricultural land makes land unproductive for multiple seasons (Ghosh et al., 2014).

Low productivity of land affects adversely lives and livelihoods. Further, it also puts an increased cost to repairing and reconstructing embankments every year. Further, loss of land also occurs due to increased erosion. The people displaced from the disappeared islands (such as Ghoramara) and other areas submerged due to rising sea level have been rehabilitated in Rudranagar Gram Panchayat (GP). Rudranagar GP is also home to the endangered Lodha tribe.

During the in-depth interview, one of our key informants told that before British intervention, the Sundarbans was largely uninhabited, dominated by mangrove forests, tigers, and tidal creeks. Indigenous forest-dwelling communities may have used parts of the Sundarbans seasonally for fishing, honey collection, and foraging. No major permanent tribal settlements were there in the delta at this time. The British colonial government began systematic reclamation of Sundarbans forests from the late 18th century to promote agriculture and collect revenue. To settle and work on these lands, the British encouraged migration of landless peasants and tribal labourers mainly the Santals from Chotanagpur Plateau (present-day Jharkhand, Odisha, Bihar) and parts of central India (Madhya Pradesh, Chhattisgarh). These groups were employed as agricultural labourers on reclaimed land, forest clearers, canal diggers, and land developers and labourers in British estates, especially in tea plantations (some moved further east later). Many people from Kanthi at Purba Medinipur migrated to the villages of the south coast of Sagar island- from Harinbari to Gangasagar village. Simultaneously, few people from Diamond harbour and Kulpi migrated to Kachuberia.

Major areas of erosion of Sagar islands are Kachuberia, Dhablat, Beguakhali. Sagar Island has a unique feature of rehabilitation shelter for the refugee. According to 2011 census the total population of Sagar Island is 2, 12, 037 and the population of the island was 1, 85, 644 in 2001. So, we find a percentage increase in population of about 14.22% which is considerably high. Such an increase is due to immigrants from nearby Lohachara and Suparibhanga. They were rehabilitated in Bankimnagar and some in Gangasagar. Some people were rehabilitated at Radhakrishnapur and Jibantala. Over the past 64 years, the island's area has reduced from 285.40 square kilometres in 1951 to 235 square kilometres in 2015, losing 50.4 square kilometres to these environmental stressors. The scheduled caste population comprising 27.8 per cent of the total population of which 0.4 per cent was only scheduled tribe and around 23 per cent was Muslim population. Rudranagar GP is also home to the Lodha tribe. Lodhas are migrated from Nayagram, Paschim Medinipur to this area.

In Sagar Island more than 1000 families are engaged in different types of livelihoods namely agriculture, prawn seed collection (Meendhara) and fisheries. Main agricultural products are paddy and betel leaf. But, as the land is very saline, it is not possible for cultivation of paddy during dry season.

The subsistence of Lodha tribe is fishing. Also, they hunt small animals and birds for their livelihood. With sea levels rising at an estimated rate of 3.14 mm per year, the effects of coastal erosion and submergence have devastated agriculture and fishing, the primary livelihoods of residents, plunging many into economic instability and poverty.

From the in-depth interview we have known that mainly the younger generation forced to migrate to Tamil Nadu, Kerala, Karnataka and Gujarat. They work as daily labourers at brick kiln factory, cardamom garden at Kerala. In Karnataka, they work at poultry farm. There are primary healthcare centres in each of Sagar Island's gram panchayats. At the primary healthcare centers, a host of rudimentary medical activity takes place, such as the administration of polio vaccines to children, pre- and post-natal care etc. From the in-depth interview we came to know that complicated pregnancies, deliveries, surgeries or any serious illnesses could not be dealt here due to lack of infrastructure or facilities. People living in this island go to Kanthi or Kakdwip for critical care and support during health emergencies. They mainly prefer going to Cuttack than Kolkata because the medical expenses are less in Cuttack.



Figure 2.3 Climate-impacted Sagar Island

CHAPTER 3-MATERIALS AND METHODS

3.1 INTRODUCTION

The main objective of the present study was to ascertain the nutritional status of the children aged two to six years and the utilization of ICDS in the Sagar and Ghoramara Islands located in the Sundarbans region. Additionally, the study also aims to identify the pattern of food intakes, extent of recommended minimum dietary diversity among children and their mothers/caregivers, adherence to the recommended Infant and Young Child Feeding (IYCF) practices, sanitation and personal hygiene practices of household members, and psychological health of mothers/caregivers. Keeping this broad objective in mind, our study design primarily focuses on these dimensions. All these aspects have been assessed through face-to-face interviews with the sampled children and their mothers/caregivers. Unstructured in-depth interviews with the members of local community were carried out to complete our understanding of the origin of the study islands, functioning of ICDS centres, vulnerability of children and their mothers/caregivers due to adverse climatic events which occur almost every year.

3.2 Study Participants

This study was conducted on children aged two to six years and their mothers/caregivers. Apart from that, some members of the local community were also interviewed. Thus, they formed the study participants.



3.3 Data and Methods

3.3.1 Selection of study islands

The study was carried out in two islands, namely, the Sagar and Ghoramara islands. Two moujas, namely, Radhakrisna Pur and Bahir Plot were selected in the Rudranagar Gram Panchayat of Sagar Island, while Raypara, Bagpara and Khasimara villages were selected in Ghoramara Island. These moujas were selected purposively to meet the objectives of the present study.

3.3.2 Survey design and Sampling strategy

As mentioned earlier, the study was primarily carried out among the children aged two to six years of age and their mothers/caregivers. Experimental designs such as Randomized Control Trial (RCT) as well as Quasi-Experimental design were not feasible in this population because of short time-frame of intervention and inadequate control group; we need to adopt a different strategy. This is a baseline survey and for this reason, a non-experimental design, specifically, a pre-post mix-method survey design has been adopted. To select the study samples, two stage-sampling designs were used. First, a complete list of children aged two to six years (precisely, currently aged between 23 and 59 months) was obtained from the Anganwari Workers (AWW) of the ICDS centres located in the study moujas. Then, 50 children and their mothers/caregivers were selected randomly from the said moujas of Ghoramara Island, while rest 50 were selected randomly from the said moujas of Sagar Island. Thus, the total number of children was 100 in the sample. Selecting samples in this way would help in maintaining randomness in the data. Besides, three members of the local community, who are knowledgeable regarding the origin of the island, issues related to maternal and child health, vulnerability due to sudden climatic shocks etc., were interviewed for in-depth understanding of the issues.

3.3.3 Time frame and fieldwork

The fieldwork for the current study was conducted during the first week of April, 2025. Before conducting the final survey, a pilot study was conducted in the villages of Kakdwip subdivision in the last week of March, 2025. The aim in the pilot survey (or pre-testing of the schedule) was to ascertain the relevancy of the questions, assessing interviewee's understanding of the language used while preparing the schedule, and modifications there off. The schedule was then modified accordingly and the final schedule was prepared. The original schedule was prepared in English and then translated to Bengali version and again back translated in English for standardization. During survey, Bengali version of the questionnaire was used.

Face-to-face interview of children and their mothers/caregivers were undertaken with the help of six surveyors (three for each island). The interviews were conducted through door-to-door visits by the team. The team of surveyors was supervised by one supervisor in each island. Meanwhile, the IDSK study team conducted focus group discussions (FGDs) with mothers/caregivers and in-depth interviews (IDIs) with local knowledgeable members of the community.

3.3.4 Tools for the data collection

The current study employed both quantitative and qualitative study framework. Both type of information (quantitative and qualitative) about children and their mothers/caregivers was collected using a structured schedule. Information regarding the children was asked to their mothers/caregivers. Free-listing of questions was used for the in-depth interviews of the members of local community, while a similar tool was used in FGDs.



Figure 3.1 Interviews through door-to-door visits

Individual schedule for quantitative and qualitative information

Individual schedule captured the following aspects: (1) basic socio-demographic, economic, and cultural profile of the mothers/caregivers, children, and households; (2) indicators of nutritional status for children (anthropometric measurements such as weight-for-age, height-for-age, weight-for-height, mid-arm circumference, while weight and height for mothers) (3) utilization of ICDS for nutritional supplementation, pre-school education, immunization, health awareness etc.; (4) morbidity profile and treatment-seeking behaviour of the children; (5) dietary pattern of children and mothers; (6) indicators of availability of basic amenities and entitlements; (7) indicators of maintaining basic health and hygiene of children and household members; and (8) mother's psychological well-being through measuring self-reported anxiety, depression and stress level using DASS21 tool (<https://thehumancondition.com/depression-anxiety-stress-scale-dass-21/>).

Based on the aforementioned arenas, quantitative data was collected regarding the place of residence, age, caste, religion, current marital status, household size, working status, household assets (durable goods and land-holding). Height, weight, and mid-arm circumference were measured among sampled children, while height and weight were measured for mothers/caregivers. Additionally, frequency of utilization of ICDS services, frequency of eating recommended diets, morbidity profile and treatment-seeking behaviour (common childhood illnesses, episode of hospitalization, medication, expenses etc.), access to basic amenities and habits related to basic health and personal hygiene, and psychological well-being of mothers/caregivers. (Copy of the questionnaire both English and Bengali are attached in Annexures I and II)

Qualitative tools

With 'social turn' in Biology, scholars are increasingly arguing that human body should not to be conceptualised as a clearly bounded predetermined entity. Rather, from the time of conception to throughout life course of individuals, intra-somatic and cellular environments, physical and social-cultural environments together bring transformations in material body (Lock, 2015). Hence, the body is biosocial from the beginning. The new epigenetic research contested the notion of universal human biology and focuses on how environmental variables such as diet, food practices, access to health care, social adversity, poverty, psychosocial stressors, climate change etc. led to biological differences in a dynamic process over time and in specific locations (Lock et al., 2021). Hence, lived experiences and stories of individuals and communities and also the contexts (physical, ecological, social) in which the communities themselves experiences are extremely important. Researchers able to show how these powerful experiences and events impact different biological pathways and contribute to the development of health and wellbeing.

Qualitative inquiry is most useful to capture these experiences and various contexts in which communities inhabit. Since nutritional status of children and mother and utilization of ICDS services in a specific ecological condition is the main focus, it is necessary to collect information on day-to-day food practices of mother and children, quality of food intake in general, contextual factors and history of inhabitation in studied islands as well as experiences and stories of struggle, anxiety, trauma during extreme weather events like cyclone, flood disasters etc.

To collect this information, focus group discussions among the mothers of 20-35 years of age were undertaken in both the study areas. In addition, some in-depth interviews among the knowledgeable persons who know about islands history, social dynamics, were undertaken to gather information on history of inhabitation, land conversion, nature of cultivation, nature of crops, income opportunities, functioning of ICDS, and major constraints. All these information help us to understand the process of life activities that actually influences leading to nutritional outcomes. All these information recorded and transcribed subsequently and used during analysis and explanation of the results.



Figure 3.2 Interviews through door-to-door visits

3.3.5 Data compilation and analysis

The structured interviews were carried out using Computer Assisted Personal Interview (CAPI) system by using Kobo Toolbox. The interviewees conducted the interviews using this system and uploaded the same through internet. A periodic check of the uploaded data was carried out in order to maintain data quality. The advantage of this technique is that it removes the time for data entry. FGDs and IDIs were transcribed, and translated into verbatim. STATA (version 17) software was used for data analysis. In this report, the quantitative results were mostly represented by descriptive statistics, univariate and bivariate analysis, while excerpts and narratives were used to illustrate the qualitative findings. Principal component analysis (PCA) was carried out with all the household durable goods and landholding to ascertain household asset index. The raw scores were further categorized in three tercile indicating – high, medium, and low. Psychological well-being was measured as mentioned in DASS21 schedule. Underweight, stunting and wasting was measured comparing WHO reference population. We did not try to compare data between Rudranagar and Ghoramara because of small sample size such comparison would be misleading. Instead, we have tried to provide a combined findings of two study sites.



Figure 3.3 FGDs with the mothers at Ghoramara Island

3.4 Ethical Clearance

Before proceeding the survey, we received the approval letter from the SEED as well as from the Institute of Development Studies Kolkata to conduct the study. In addition, the study objectives were explained to all the eligible participants, and verbal informed consent was taken from those who were interested to participate in the study. We obtained consent from the mothers/caregivers of children aged two to six years to measure their height, weight, and mid arm circumference. Throughout the study period, data confidentiality was upheld, and study participants' identities were masked during data analyses.

3.5. Limitation of the study

While this baseline study offers a comprehensive overview of the socio-demographic characteristics, caregiving practices, health and nutritional status, and access to basic services among children aged two to six years and their mothers or caregivers in Ghoramara and Sagar Islands, certain limitations must be acknowledged.

Firstly, the small sample size restricts the generalizability of the findings. Although efforts were made to ensure representation across the study areas, the limited number of respondents may not capture the full diversity of experiences and conditions prevalent in the broader population.

Secondly, time constraints during data collection posed challenges in conducting in-depth assessments and follow-ups, which may have impacted the comprehensiveness of certain data points. This limitation particularly affected the ability to explore seasonal variations in nutrition and diseases, caregiving practices, and household vulnerabilities.



Figure 3.4 In-depth Interview of one of the key informant

CHAPTER 4-SAMPLE PROFILE OF HOUSEHOLD, CHILDREN AND THEIR MOTHERS/CAREGIVERS

4.1 INTRODUCTION

This chapter provides a comprehensive profile of the children (between the ages of two and six years) and their mother or caregivers surveyed for establishing Early Childhood Care Centres (ECCC) in Ghoramara and Sagar islands of the Sunderbans. The study aims to capture essential socio-demographic and economic characteristics, caregiving practices, health and nutritional status, and access to basic amenities of life. The information collected helps to understand the background and needs of the targeted population and to inform the design and delivery of early childhood care centres.



Household Profile

Table 4.1 Percentage of households having access to various government benefits

	Overall (percentage)	Total
Bank account		
Number of households having access	96 (96.0%)	100
DBT		
Number of households having access	73 (73.0%)	100
Food security card		
Number of households having access	98 (98.0%)	100
SHG		
Number of households having access	79 (79.0%)	100
Swasthya Sathi card		
Number of households having access	82 (82.0%)	100

Figure 4.1: Number of households having access to various government benefits

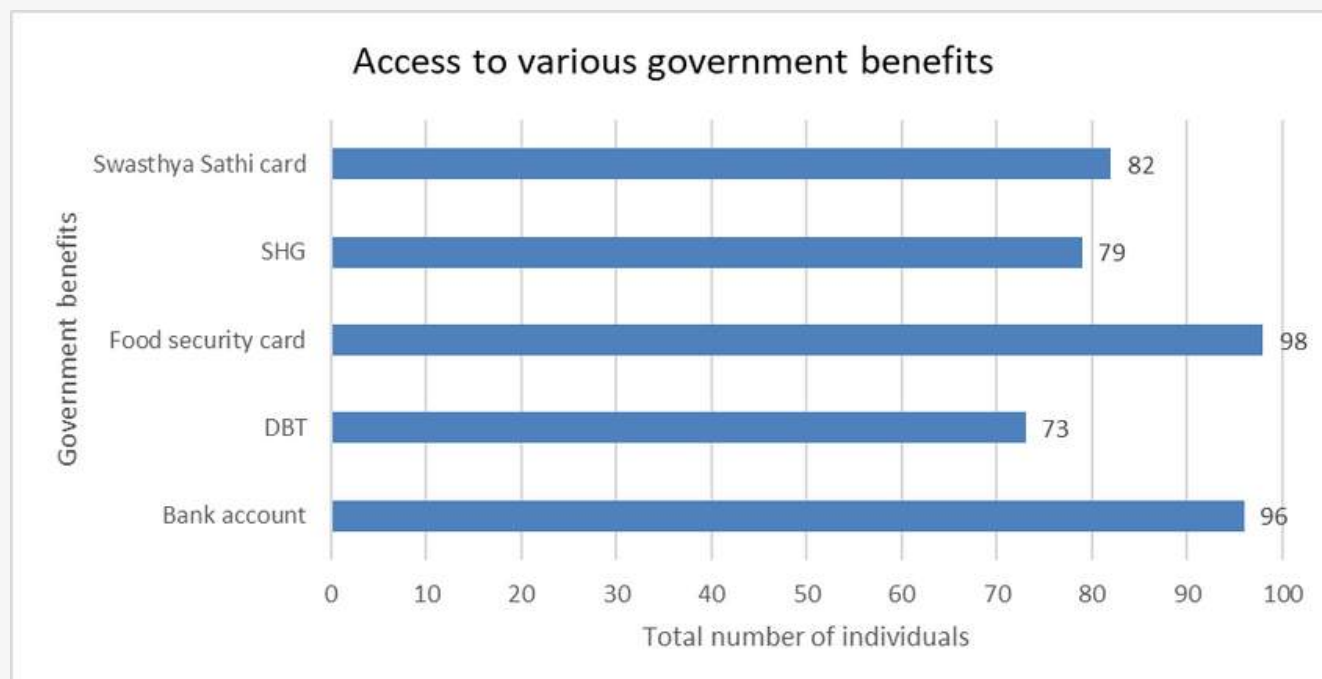


Table 4.1 and Fig 4.1 presents data on the proportion of households in the study area that have access to various government schemes and welfare benefits, including banking services, Direct Benefit Transfers (DBT), food security, Self-Help Groups (SHGs), and health insurance through the Swasthya Sathi scheme.

Bank Account Access: 96 households across both islands have access to banking facilities, reflecting widespread inclusion in the formal financial system in both areas.

Access to Direct Benefit Transfers (DBT): Total 73 households across both locations receiving government benefits through DBT.

Food Security Card Ownership: 98 households have access to subsidized food through the Public Distribution System (PDS).

Membership in Self-Help Groups (SHGs): In total, 79 households have at least one SHG member.

Swasthya Sathi Card Ownership (Health Insurance): Overall 82 households being covered under the state-sponsored health protection scheme, reflecting consistent outreach by the government health programs in both locations.

Table 4.2 Percentage of households having access to basic amenities

	Overall (percentage)	Total Range
Mean number of rooms in household (range)	1.9	(1-4)
Households having kitchen outside rooms	58 (58.0%)	100
Households using safe cooking fuel	0 (0%)	100
Households have access to safe drinking water	75 (75.0%)	100
Households have access to safe sanitation	55 (55.0%)	100
Households have drainage facility	53 (53.0%)	100

Table 4.2 presents data on the availability of basic amenities across surveyed households in the study area. The average number of rooms per household is 1.9, with the number ranging from 1 to 4 rooms, indicating limited living space and potential overcrowding.

A little over half of the households (58%) reported having a kitchen located outside the main living quarters, which may help reduce indoor air pollution but could also pose challenges in terms of hygiene and convenience, particularly during adverse weather conditions.

None of the households reported using safe cooking fuel, highlighting a complete reliance on traditional biomass fuels such as firewood or cow dung. This raises significant concerns regarding indoor air quality and related health risks, which are not only inefficient but also harmful to human health and the environment.

75% of households reported having access to safe drinking water, and 55% had access to safe sanitation facilities, reflecting moderate progress under water and sanitation programs in the area.

However, only 53% of the households had a proper drainage facility, highlighting gaps in wastewater infrastructure. This deficiency can lead to environmental health risks, including waterlogging and vector-borne diseases, particularly during the monsoon season.

Overall, while notable strides have been made, there remain critical gaps in access to safe sanitation, drainage, and clean cooking environments. These areas require urgent attention to achieve comprehensive household-level health and hygiene outcomes in the region.

Table 4.3 Percentage of households possessing various household assets(durable goods, land and farm animals)

	Overall percentage	Total
Household goods		
Bed (Cot)	96 (96.0%)	100
Electricity/solar	92 (92.0%)	100
Electric/solar fan	91 (91.0%)	100
Electric/solar light	91 (91.0%)	100
Television	22 (22.0%)	100
Sewing machine	2 (2.0%)	100
Internet	88 (88.0%)	100
Kitchen garden	17 (17.0%)	100
Radio/transistor	8 (8.0%)	100
Mobile phone	82 (82.0%)	100
Bicycle	69 (69.0%)	100
Motorcycle/scooter	10 (10.0%)	100
Fishing net	66 (66.0%)	100
Mosquito net	97 (97.0%)	100
E-rickshaw	4 (4.0%)	100
House on own land	72 (72.0%)	100
Own agricultural land	40 (40.0%)	100
Cultivating the land among those households having own land	39 (39.0%)	100
Kuccha house	62 (62.0%)	100
Pucca house	7 (7.0%)	100
Semi-Pucca house	31 (31.0%)	100

Farm animals		
Chicken/ducks	42 (42.0%)	100
Goats/sheep	27 (27.0%)	100
Cows/bulls/buffaloes	38 (38.0%)	100
Pigs	5 (5.0%)	100

Table 4.3 provides insights into the ownership patterns of durable household goods, land, housing conditions, and farm animals among the surveyed households. The data reflect both basic living standards and livelihood strategies in the region.

Almost all households (96%) have a bed or cot, indicating a basic level of furnishing for sleeping arrangements. Electricity or solar power is available to 92%, while solar/electric fans and lights are present in 91% of households, suggesting decent coverage of alternative energy sources. A notably small fraction of households own a television (22%) or sewing machine (2%), indicating limited access to these types of consumer durables. A substantial majority (88%) have internet access, reflecting a significant digital penetration even in isolated islands. Mobile phones are common among households (82%), while 69% own a bicycle, suggesting relatively high connectivity and mobility within islands.

Electric items like refrigerators or appliances are not mentioned, but other assets include mosquito nets, which almost universally are present (97%), likely reflecting preventive public health initiatives. Other items like radio/transistors (8%) and e-rickshaws (4%) are less common. A notable asset is the fishing net, owned by 66% of households, highlighting the importance of fishing as a livelihood in the community.

Land Ownership

A significant portion of households (72%) live in a house on their own land, while 40% own agricultural land. However, among those owning land, only 39% actively cultivate it due to crop failure caused by saline intrusion.

The most common type of dwelling is the kaccha house, comprising 62% of households, which generally indicates less durable housing construction. Semi-pucca houses are present in 31% of households. Only 7% live in pucca houses, which are typically more resilient and constructed with durable materials.

The table records varied ownership of livestock. 42% of households rear chicken or ducks. Goats or sheep are owned by 27% of the households. Cows, bulls, or buffaloes are kept by 38% of the households. Only 5% of households have pigs. The mixed presence of farm animals further indicates a reliance on small-scale farming and fishing, which play essential roles in the local economy and serve as sources of nutrition.

Socio-Demographic Profile

Gender	Ghoramara Villages				Rudranagar Villages		
	Raypara	Bagpara	Khashimara	Total	Radhakrishnapur	Bahirplot	Total
Boys	10	8	3	21	22	0	22
Girls	14	8	7	29	26	2	28
Total	24	16	10	50	48	2	50

The data presented in the table above (4.4) and figure below (4.4a, b) outline the gender-wise distribution of children across the selected villages in two islands— Ghoramara and Rudranagar— where the fieldwork was conducted. The figures offer insights into the demographic composition of the child population in these vulnerable coastal areas.

Ghoramara Island

Ghoramara Island comprises three selected villages: Raypara, Bagpara, and Khashimara. A total of 50 children were identified across these villages. Raypara recorded the highest number of children (24), with 10 boys and 14 girls. Bagpara followed with a total of 16 children, evenly distributed between boys (8) and girls (8). Khashimara had the lowest number of children (10), including 3 boys and 7 girls.

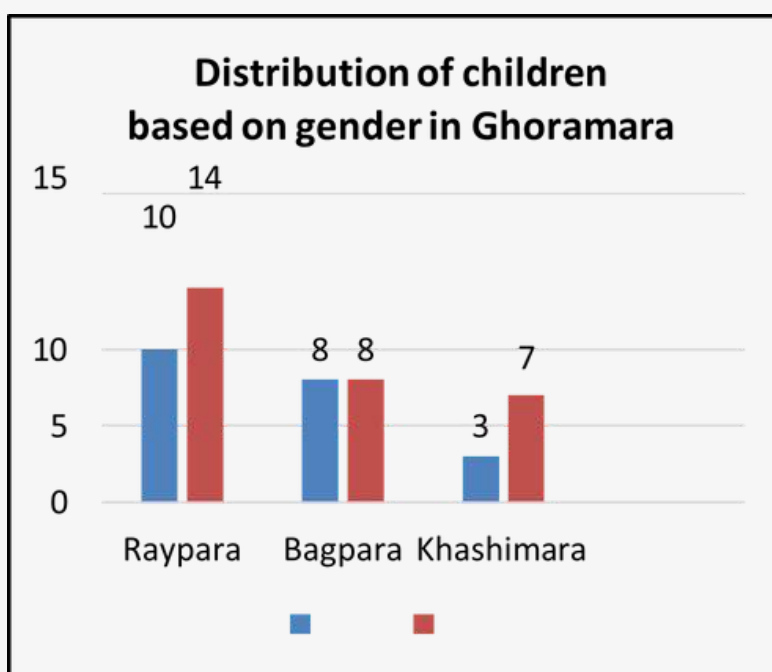


Figure 4.4a: Distribution of children based on Gender across the selected villages in Ghoramara

In total, Ghoramara Island had 21 boys and 29 girls, indicating a higher number of girls compared to boys. The gender gap is most evident in Raypara and Khashimara, where girls outnumber boys by 4 and 4, respectively.

Rudranagar Island

The Rudranagar site includes two selected villages, namely, Radhakrishnapur and Bahirplot. The total number of children surveyed across these villages also amounts to 50. Radhakrishnapur had 48 children, comprising 22 boys and 26 girls. Bahirplot, on the other hand, had only 2 children, both of them were girls.

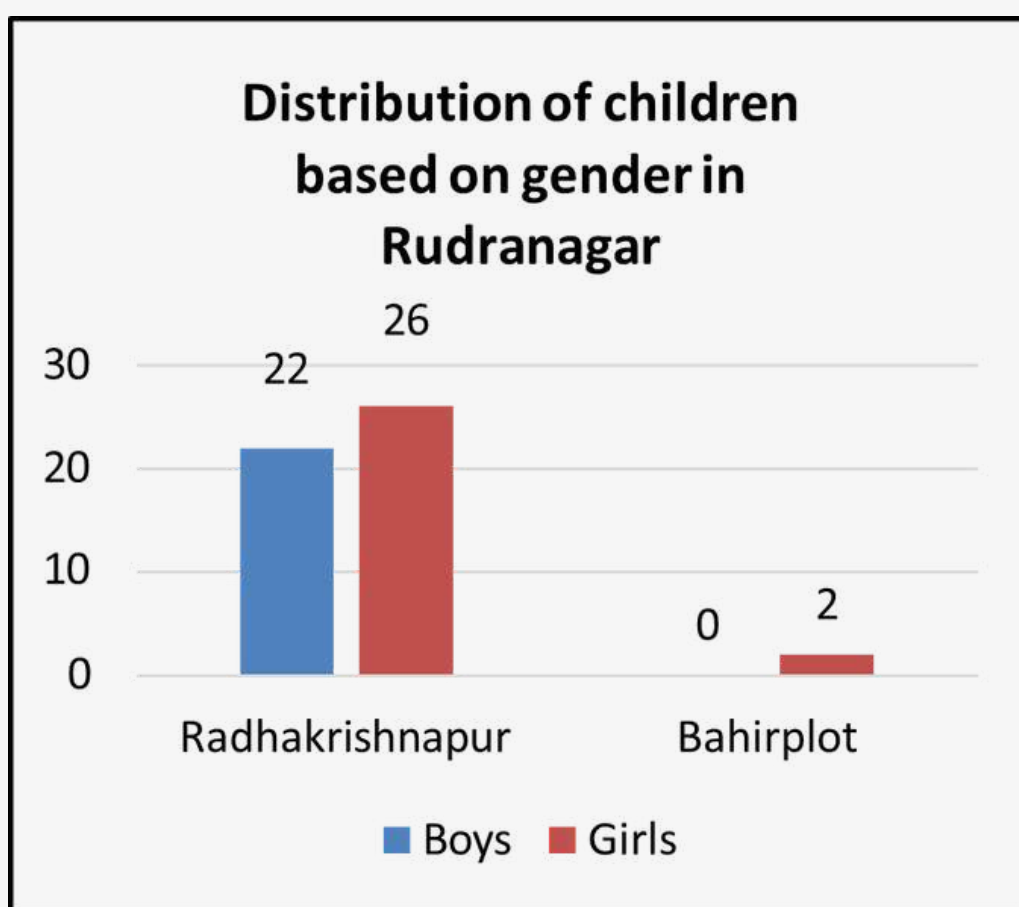


Figure 4.4b: Distribution of children based on Gender across the selected villages in Rudranagar

Overall, Rudranagar Island showed a slightly higher number of girls (28) than boys (22), consistent with the pattern observed in Ghoramara.

Both islands show a higher number of girls than boys, with Ghoramara having 8 more girls than boys, and Rudranagar having 6 more girls than boys. Raypara and Radhakrishnapur are the most populous villages in terms of child population, contributing significantly to their respective island totals.

Table 4.5 Demographic characteristics of the households as reported by the mothers/ caregivers

	Overall	Percentage (Range)
Number of family members		
Up to 3	21	21.0%
4-6	67	67.0%
7-9	12	12.0%
Total	100	
Mean household size (range)	4.85	(3-9)
Number of elderly (60 years and above)		
0	71	71.0%
1-2	29	29.0%
Total	100	
Number of adult members (18-59 years)		
1-2	57	57.0%
3-5	41	41.0%
6-8	2	2.0%
Total	100	
Number of children (6-17 years)		
0	50	50.0%
1-2	45	45.0%
=3	5	5.0%
Total	100	
Number of children (0-6 years)		
1-2	97	97.0%
=3	3	3.0%
Total	100	
Number of dead children		
0	92	92.0%
1-2	8	8.0%
Total	100	

Table 4.5 presents the demographic profile of households in the study area, as reported by mothers or primary caregivers. The data reflects household composition in terms of size, age distribution, and child mortality.

Household Size

Majority households (67%) consist of 4 to 6 members, while 21% have up to 3 members, and a smaller segment (12%) includes 7 to 9 members. The mean household size is approximately 4.85 members, with a range between 3 and 9 members, indicating moderately sized families.

Elderly Population (Aged 60 and above)

A significant portion of households (71%) reported having no elderly members, while 29% had 1 to 2 elderly individuals. This suggests a relatively younger population structure, with limited presence of older dependents.

Adult Members (Aged 18–59 Years)

Most households have a working-age adult population: 57% reported having 1 to 2 adults, and 41% have 3 to 5 adults. A very small proportion (2%) reported 6 to 8 adults, indicating limited extended family structures.

Children Aged 6–17 Years

Half of the households (50%) reported having no children in the 6–17 age group, whereas 45% had 1 to 2 children, and only 5% reported having 3 or more. This may indicate a demographic shift toward younger age groups or smaller family sizes.

Young Children (Aged 0–6 Years)

Nearly all households (97%) have 1 to 2 children under the age of 6, aligning with the study’s focus on early childhood. Only 3% reported 3 or more children in this age group.

Child Mortality

Most households (92%) reported no history of child death, while 8% had experienced 1 to 2 child deaths. Although relatively low, this figure still reflects critical concerns related to child health and survival in the region.

Table 4.6 Demographic characteristics of the children between the ages of two and six years

	Number of children between 2-6 years of age	Percentage
Rudranagar		
1-2	47	94.0 %
> 3	3	6.0 %
Total	50	
Ghoramara		
1-2	50	100.0 %
> 3	0	0.0 %
Total	50	

This table presents the distribution of households based on the number of children aged between two and six years in the two study locations: Rudranagar and Ghoramara.

A total of 100 households were included in the analysis, of which 97 households (97%) reported having 1 to 2 children in the 2–6-year age group. Only 3 households (3%) reported having 3 or more children in this age category. In Rudranagar, 94% of households (47 out of 50) have 1 to 2 children, while only 6% (3 out of 50) have three or more children in this age group. In Ghoramara, 100% of households (all 50) have 1 to 2 children aged between 2 and 6 years. There are no households with three or more children in this age range.

Table 4.7 Socio-demographic characteristics of the mothers/caregivers

	Rudranagar		Ghoramara		Overall	Percentage
Socio-demographic characteristics	Number	Percentage	Number	Percentage	Number	
Age (in years)						
<=20	6	12.0%	4	8.0%	10	10.0%
21-30	34	68.0%	40	80.0%	74	74.0%
31-40	10	20.0%	4	8.0%	14	14.0%
41-50	0	0.0%	2	4.0%	2	2.0%
Total	50		50		100	
Religion						
Hindu	50	100.0%	33	66.0%	83	83.0%
Muslim	0	0.0%	17	34.0%	17	17.0%
Total	50		50		100	
Caste						
Schedule caste (SC)	14	28.0%	8	16.0%	22	22.0%
Schedule tribe (ST)	8	16.0%	1	2.0%	9	9.0%
General	23	46.0%	39	78.0%	62	62.0%
Other backward caste (OBC)	5	10.0%	2	4.0%	7	7.0%
Total	50		50		100	
Current marital status of the mother/caregiver						
Currently married	50	100.0%	48	96.0%	98	98.0%
Widowed	0	0.0%	1	2.0%	1	1.0%
Did not disclose	0	0.0%	1	2.0%	1	1.0%
Total	50		50		100	
Completed years of schooling of the mother/ caregiver (in years)						
1-8	22	44.0%	24	48.0%	46	46.0%
9-10	20	40.0%	18	36.0%	38	38.0%
>10	8	16.0%	8	16.0%	16	16.0%
Total	50		50		100	
Mean completed years of schooling	7.66 (1-17)		8.7 (1-21)		8.18 (1-21)	
Currently working						
Yes	1	2.0%	1	2.0%	2	2.0%
No	49	98.0%	49	98.0%	98	98.0%
Total	50		50		100	

Table 4.7 presents the socio-demographic profile of mothers or primary caregivers from the study sites in Rudranagar and Ghoramara. The information includes age, religion, caste, marital status, education, and employment status. These characteristics provide important contextual background for understanding maternal perspectives and caregiving practices in vulnerable coastal communities.

Age Distribution

The majority of mothers/caregivers were in the 21–30 years age group, representing 74 respondents in total—34 from Rudranagar (45.94%) and 40 from Ghoramara (54.05%). 10 mothers were aged ≤ 20 years, with 6 from Rudranagar (60%) and 4 from Ghoramara (40%). The 31–40 years group included 14 mothers, predominantly from Rudranagar (10 mothers, 71.43%), and only 4 from Ghoramara (28.57%). This shows that most caregivers were in their prime reproductive and caregiving age, with Ghoramara showing slightly younger mothers in the 21–30 age group.

Religious Composition

In Rudranagar, all 50 households identified themselves as Hindu, accounting for 60.24% of the total sample. In Ghoramara, 33 households were Hindu (39.76%), while 17 were Muslim i.e Muslims in the sample belong only to Ghoramara. This indicates a religiously homogenous sample in Rudranagar, while Ghoramara has a more diverse religious composition, with a significant Muslim minority (34% of its total caregivers) in the sample.

Caste Composition

General category mothers/caregivers were the most common, with 62 in total—23 in Rudranagar (37.09%) and 39 in Ghoramara (62.90%). Scheduled Caste (SC) participants numbered 22, more prevalent in Rudranagar (14 caregivers, 63.64%). Scheduled Tribe (ST) caregivers, including members of the Lodha Particularly Vulnerable Tribal Group (PVTG), were mostly found in Rudranagar (8 out of 9 total ST caregivers). Other Backward Castes (OBC) accounted for a smaller segment (7 caregivers), again more concentrated in Rudranagar (5 caregivers).

This indicates that while Ghoramara has higher representation from the General category, Rudranagar reflects greater social diversity, especially among marginalized groups such as SC, ST (including Lodha PVTG), and OBC households.

Marital Status

98 of the 100 caregivers were currently married, evenly distributed across both islands. One caregiver in Ghoramara was widowed, and another chose not to disclose marital status. The overwhelmingly married status across both sites indicates stable family structures, at least formally.

Educational Attainment

A total of 46 caregivers had 1–8 years of schooling—22 from Rudranagar (47.82%) and 24 from Ghoramara (52.17%). 38 caregivers had 9–10 years of schooling, nearly evenly distributed—20 in Rudranagar (52.63%), and 18 in Ghoramara (47.36%). The mean years of schooling were higher in Ghoramara (8.70 years) compared to Rudranagar (7.66 years). The overall range of completed education varied widely, from 1 to 21 years.

Employment Status

Only 2 caregivers reported being currently employed one from each island. The remaining 98 caregivers (49 each from Rudranagar and Ghoramara) were not engaged in paid work. These points to extremely low workforce participation among mothers, which is likely shaped by gender norms, caregiving responsibilities, and local economic conditions.

4.3. Conclusion

The housing profile across the two islands reflects a substantial proportion of families residing in semi-permanent or temporary structures, highlighting underlying socio-economic vulnerabilities and heightened exposure to environmental risks. These risks are particularly concerning in regions frequently impacted by climatic disruptions, requiring targeted, resilient community-based interventions.

The household asset base and living conditions signal the necessity for localized development strategies that are tailored to each community's realities and resilience needs. The presence of child mortality, even if limited, indicates the continuing impact of healthcare access barriers, nutritional deficiencies, and broader social stressors, necessitating urgent and integrated support systems for families with young children.

Demographic data points to smaller household sizes, with the majority of families having one or two children aged two to six years—an ideal window for early developmental investment. The slight predominance of female children calls for a gender-responsive lens in service delivery. These insights are critical for designing age-specific, need-based programming in nutrition, psychosocial stimulation, and health education. Overall, the socio-demographic patterns reinforce the importance of household-centered, early intervention models that address caregiving support, parental awareness, and climate-linked stressors. A consistent pattern of low maternal workforce participation further emphasizes the need for empowerment-based approaches that uplift caregiving capacities while enhancing health and well-being outcomes for children.

CHAPTER 5-FINDINGS FROM THE FIELD

5.1 INTRODUCTION

This chapter presents child nutritional status, their mother's or caregiver's nutritional status, food habit, dietary diversity, mean dietary score etc. and their association with different socio-demographic, economic and cultural characteristics.

The findings are described and explained from the quantitative and qualitative surveys. Findings from the quantitative survey need to be interpreted with caveats because of small sample size.



Nutritional status of children aged two to six years

Table 5.1 Nutritional status of children aged two to six years in the study areas

	Overall	Percentage
Underweight (weight-for-age)		
Below -2SD (underweight)	35	35.00%
Total	100	
Stunted (height-for- age)		
Below -2 SD	28	28.00%
Total	100	
Wasting (weight- for-height)		
Below -2 SD	39	39.00%
Total	100	
Mid-Upper Arm Circumference (MUAC)		
11.5≤ MUAC ≤12.5	34	34.00%
MUAC > 12.5	66	66.00%
Total	100	
CIAF	59	59.00%
Total	100	

The table 5.1 presents a detailed overview of the nutritional status of children between two to six years of age based on multiple anthropometric indicators in the study areas.

Underweight (Weight-for-Age)

A significant proportion of children (35%) were found to be underweight, i.e., their weight was below -2 standard deviations (SD) from the WHO reference median. This reflects a concerning level of chronic and/or acute undernutrition.

Stunting (Height-for-Age)

About 28% of the children were stunted, indicating that more than a quarter of the child population suffers from long-term nutritional deprivation, which has likely affected their linear growth.

Wasting (Weight-for-Height)

A total of 39% of the children were wasted, showing signs of acute malnutrition. This is the highest among the three conventional anthropometric indicators and points to recent and severe weight loss possibly due to illness or inadequate food intake.

Mid-Upper Arm Circumference (MUAC)

MUAC is a quick screening tool for acute malnutrition. Around 34% of children had MUAC values between 11.5 and 12.5 cm, which indicate moderate acute malnutrition. The remaining 66% had MUAC values above 12.5 cm, suggesting a better nutritional status in this subset.

Composite Index of Anthropometric Failure (CIAF)

The CIAF is a comprehensive measure that captures the overall burden of undernutrition by identifying children experiencing any form of anthropometric failure. The table shows that 59% of children fell into at least one category of nutritional failure, reflecting a high cumulative burden of malnutrition in the study population.

The findings highlight a serious public health concern, with high levels of underweight, stunting, wasting, and overall anthropometric failure. These indicators underscore the urgent need for targeted nutritional interventions, health services, and improved caregiving practices in the study areas.

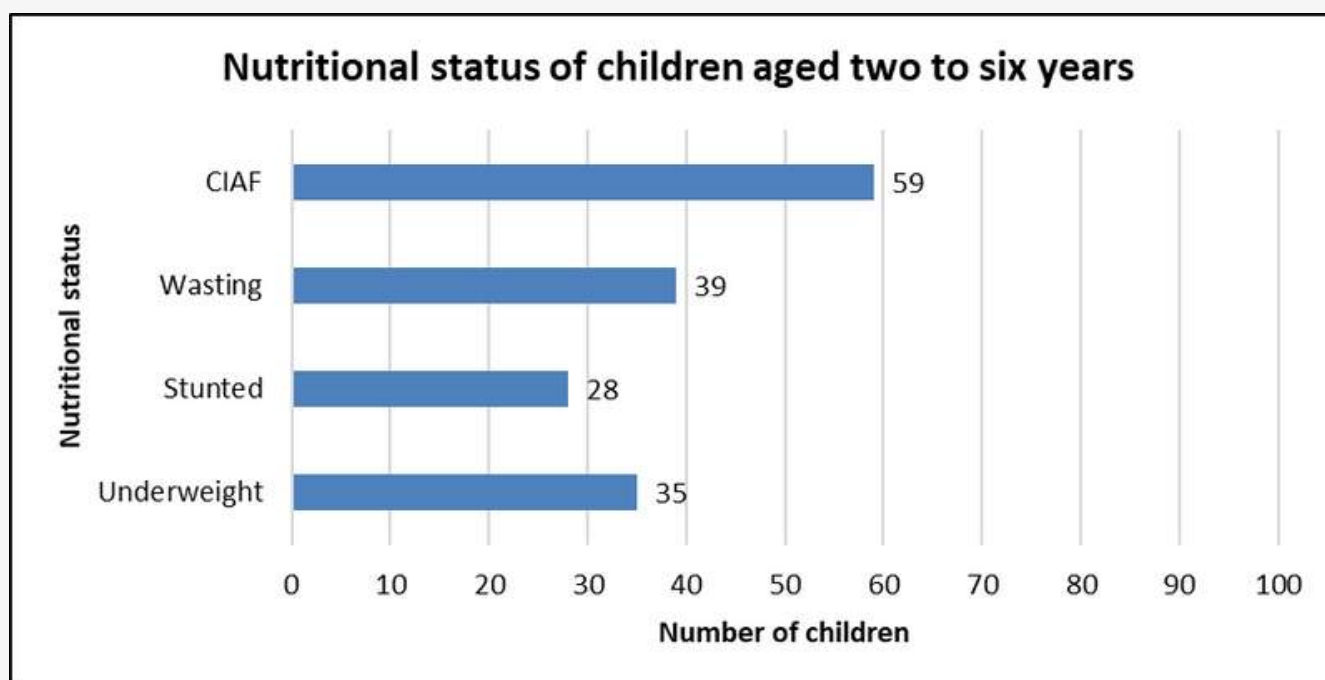


Figure 5.1: Nutritional status of children between two and six years of age

The above bar chart presents the distribution of children (out of 100) experiencing different forms of undernutrition in the study area.

The highest proportion, 59 children, fall under CIAF, indicating that more than half of the children suffer from at least one form of anthropometric failure (underweight, stunting, or wasting). 39 children are wasted, reflecting acute malnutrition—suggesting recent or current weight loss, possibly due to inadequate diet or illness. 35 children are underweight, highlighting both acute and chronic nutritional deficiencies. 28 children are stunted, indicating long-term nutritional deprivation affecting linear growth.

Table 5.2 Comparison of child nutritional status between study area and overall West Bengal (in per cent)

	Study area	West Bengal, NFHS-5, 2019-21
Underweight (weight-for-age)		
Below -2SD (underweight)	35	32
Stunted (height-for-age)		
Below -2 SD	28	34
Wasting (weight-for-height)		
Below -2 SD	39	20

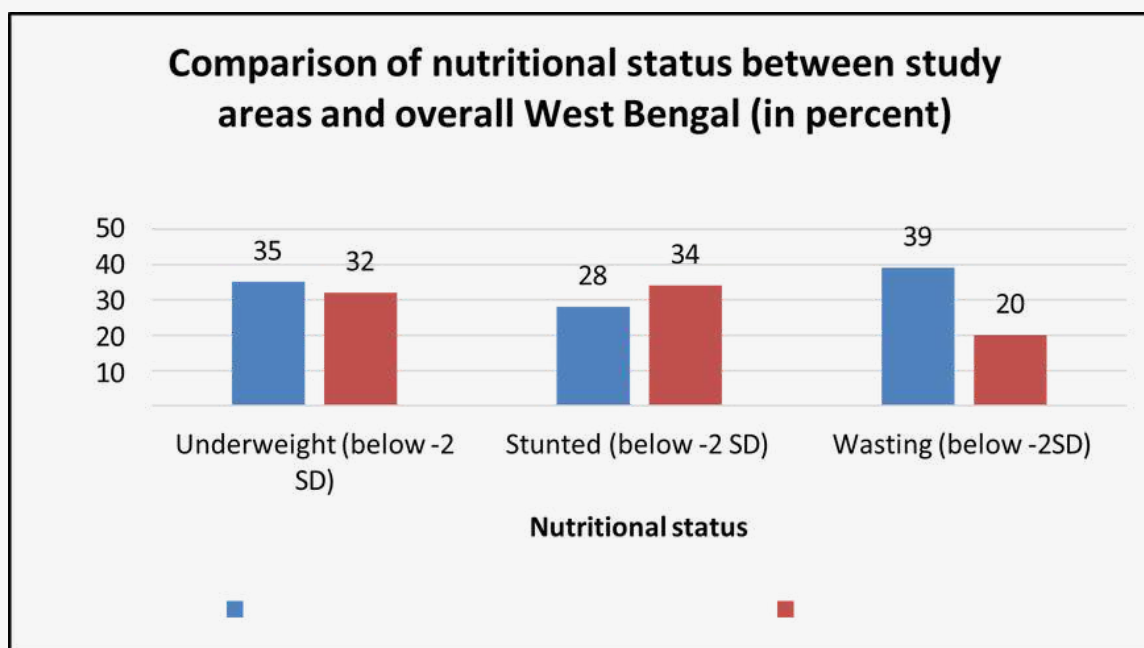


Figure 5.2 Comparison of the nutritional status of children between the ages of two-six years between the study areas and West Bengal (in per cent)

This section presents a comparative analysis of child nutritional indicators in the study areas—Rudranagar and Ghoramara (combined)—with state-level data for West Bengal, (as obtained from the fifth round of National Family Health Survey (NFHS-5), 2019-21, focusing on three key anthropometric measures: underweight (weight-for-age), stunting (height-for-age), and wasting (weight-for-height). It is important to note that the data for overall West Bengal represents children aged 6 to 59 months, somewhat aligning with the two to six years age group studied in Rudranagar and Ghoramara.

Underweight (Weight-for-Age)

In the combined study areas, 35% of children were found to be underweight, somewhat higher than the state average of 32% in West Bengal. While this difference may appear marginal, it still signals a heightened level of chronic under-nutrition among children in these island communities. The slightly elevated underweight rate in Rudranagar and Ghoramara may reflect their greater vulnerability to food insecurity and limited access to healthcare and nutritional support services due to geographical isolation.

Stunting (Height-for-Age)

The prevalence of stunting, which indicates long-term nutritional deprivation and poor linear growth, was lower in the study areas (28%) compared to the state average of 34%. This suggests that although stunting remains a concern in Rudranagar and Ghoramara, children in these areas may have had somewhat better height-for-age outcomes than the overall state population. This could be attributed to community-level factors such as breastfeeding practices, or recent interventions in early childhood development.

Wasting (Weight-for-Height)

The most striking disparity appears in the case of wasting, an indicator of acute malnutrition. The combined prevalence of wasting in Rudranagar and Ghoramara was 39%, which is alarmingly higher than the state average of 20%. This nearly twofold increase points to a significant short-term nutritional crisis in the island areas, likely driven by recurrent climatic hazards, disrupted food supply chains, inadequate sanitation, and poor dietary diversity. High levels of wasting indicate recent and severe weight loss, suggesting that children in these regions are at elevated risk of morbidity and mortality.

	Male	Female	Overall (Percentage)	Total
Underweight (weight-for-age)				
Below -2SD (underweight)	12	23	35 (35.0%)	100
Stunted (height-for-age- age)				
Below -2 SD	12	16	28 (28.0%)	100
Wasting (weight-for-height)				
Below -2 SD	16	23	39 (39.0%)	100
Mid-Upper Arm Circumference				
11.5≤ MUAC ≤12.5	14	20	34 (34.9%)	100
MUAC > 12.5	29	37	66 (66.0%)	100
CIAF	23	36	59 (59.0%)	100

Table 5.3 Nutritional status of children aged two to six years in the study areas by gender

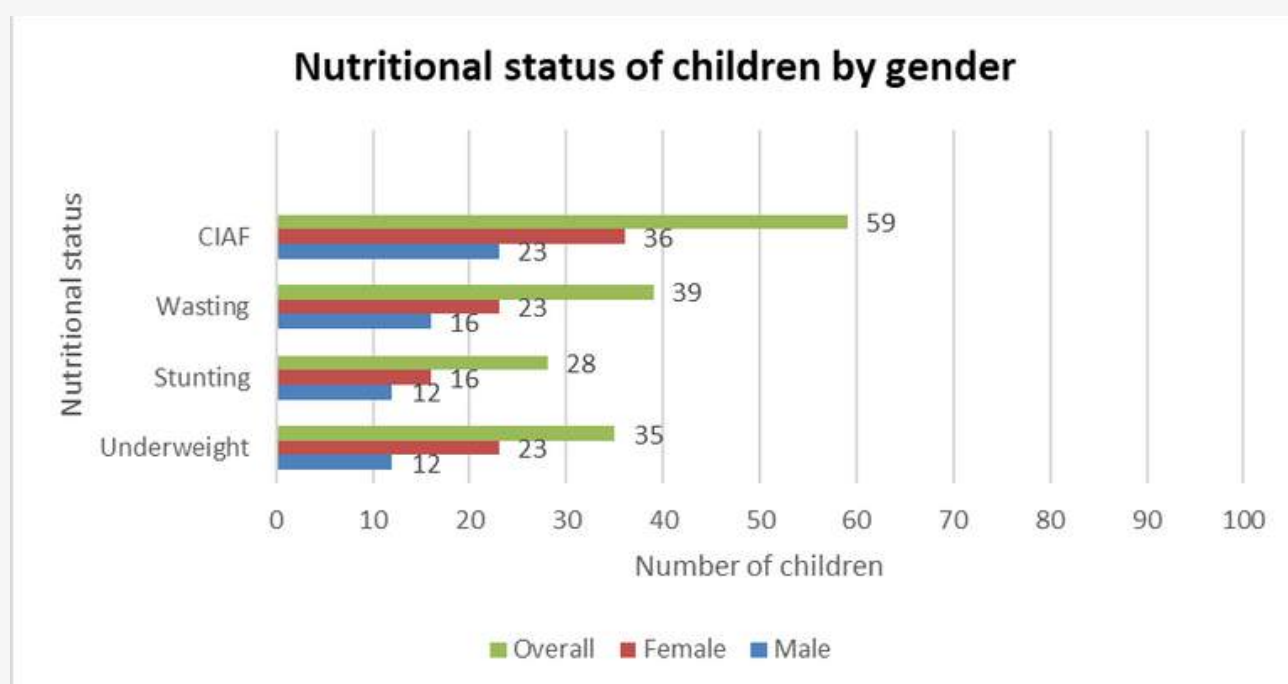


Figure 5.3: Prevalence of underweight, stunting, wasting and CIAF by gender

Table 5.3 and figure 5.3 present a gender-wise breakdown of the nutritional status of 100 children aged between two and six years across several indicators—underweight, stunting, wasting, Mid-Upper Arm Circumference (MUAC), and Composite Index of Anthropometric Failure (CIAF):

Underweight (Weight-for-Age):

12 males and 23 females were underweight (below -2 SD), accounting for 35% of the total sample. Underweight is more prevalent among female children.

Stunted (Height-for-Age):

12 males and 16 females were stunted, totaling 28% of the children. Again, a slightly higher proportion of females are more affected compared to their male counterparts.

Wasting (Weight-for-Height):

16 males and 23 females were wasted, indicating a 39% prevalence of wasting. The condition is more commonly observed among females than males.

Mid-Upper Arm Circumference (MUAC):

34 children (34.9%) had MUAC values between 11.5 and 12.5 cm, suggesting mild to moderate malnutrition (14 males, 20 females).

Composite Index of Anthropometric Failure (CIAF):

59 children (59%) were found to be nutritionally deficient under one or more anthropometric indicators. This includes 23 males and 36 females, reinforcing the trend of higher nutritional vulnerability among female children compared to their male counterparts.

Across all indicators, female children consistently show poorer nutritional outcomes compared to males, suggesting an early childhood gender-based disparity in nutritional status in the study areas. This highlights the need for targeted nutritional interventions, especially focused on improving the health of girls in the two to six age group.

Receiving aid from AWC, ICDS or any other community health worker

Table 5.4 Number (percentage) of children between two and six years of age who received aid from an Anganwadi centre (AWC), ICDS or any other community health worker during preceding 12 months

	Received food from AWC or ICDS		Received childhood care or pre-school education	
	Overall	Percentage	Overall	Percentage
Not at all	26	26.00%	57	57.00%
Almost daily	70	70.00%	15	15.00%
At least once a week	2	2.00%	14	14.00%
At least once a month	1	1.00%	9	9.00%
Less often	1	1.00%	5	5.00%
TOTAL	100		100	
	Counselling on immunisation		Counselling on food habits	
Received	41	41.00%	29	29.00%
Did not receive	57	57.00%	71	71.00%
Do not know	2	2.00%	0	0.00%
TOTAL	100		100	

The table 5.4 explores the level of support received by children from Anganwadi Centres (AWCs), the Integrated Child Development Services (ICDS), and community health workers in the past 12 months. The assessment covers key components such as food distribution, pre- school education, and counselling services related to immunisation and food habits.

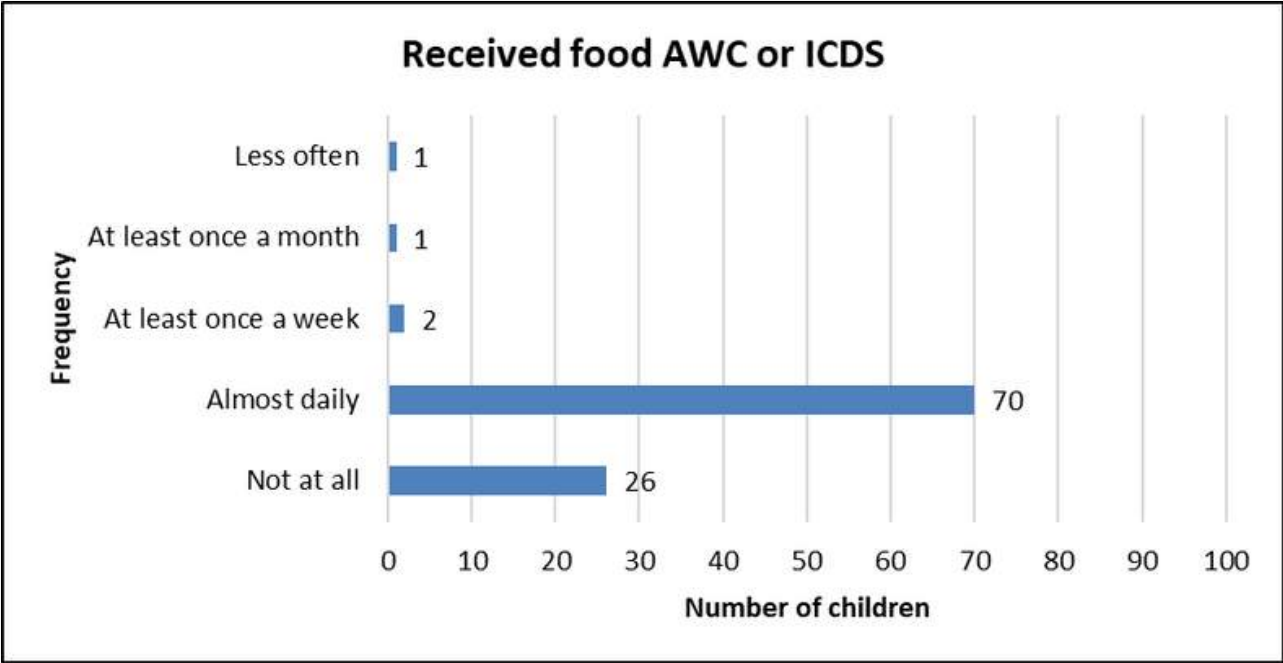


Figure 5.4a: Number of children between two and six years of age who received food from AWC or ICDS

The above figure illustrates the frequency with which 100 children received food from Anganwadi Centres (AWCs) or through the Integrated Child Development Services (ICDS). A majority—70 out of 100 children—received food almost daily, indicating regular service delivery for most. However, 26 children did not receive any food from the AWC or ICDS, pointing to notable gaps in outreach or access.

While the percentage of children receiving meals appears encouraging, the quality of food served remains a concern. Discussions with mothers during focus group interactions revealed that meals typically consist of basic preparations such as khichri, lacking diversity and often missing essential nutrient groups critical for the child’s holistic growth and development.

Additionally, many children prefer to carry the food home, as most centres lack adequate space and seating arrangements for on-site consumption. This compromises both the nutritional value and the social experience intended through community-based feeding.

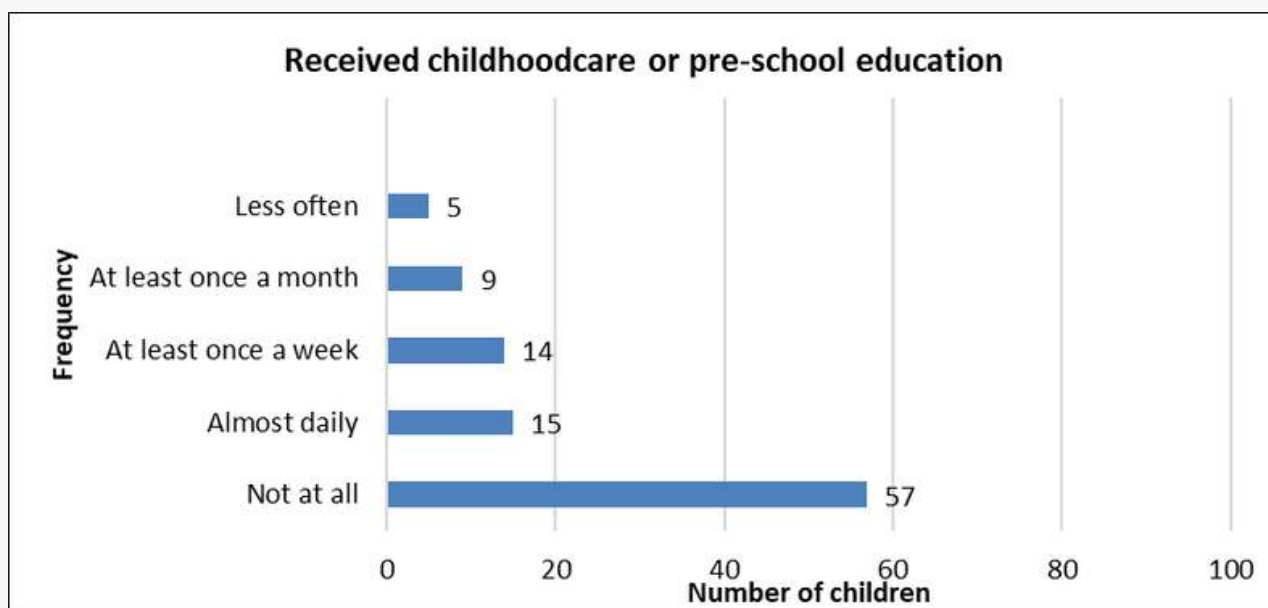


Figure 5.4b: Number of children between two and six years of age who received childhood care or pre-school education from AWC or ICDS

The above figure 5.4b presents access to pre-school education and care was considerably lower than food distribution services:

Majority children (57 out of 100) did not receive any form of early childhood care or pre-school education. This highlights a serious gap in service coverage, availability, and accessibility. Only 15 children accessed such services almost daily, indicating that regular participation is low. 14 children received childcare or pre-school education weekly, showing some engagement but not on a daily basis.

These figures highlight a significant gap in early childhood education, learning opportunities from the local AWC or ICDS. The focus group discussions among the mothers of those children emphasised that children do not get any pre-school education from the ICDS because of its poor infrastructural facilities.

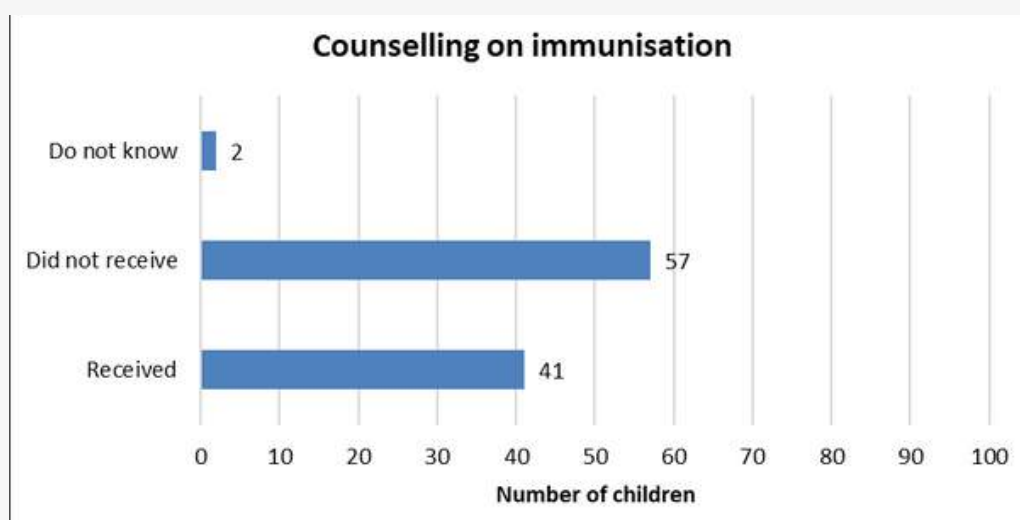
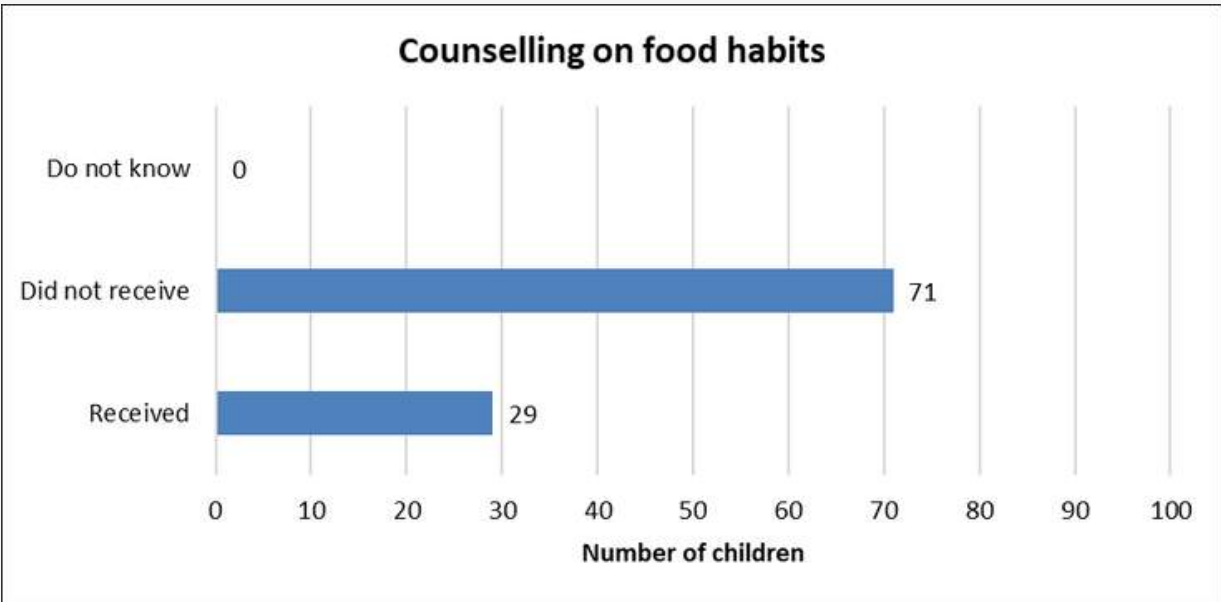


Figure 5.4c: Number of children between two and six years of age who received counselling on immunization from AWC or ICDS

In figure 5.4c This horizontal bar chart displays the number of children whose caregivers reported receiving counselling on immunisation. *The largest group, 57 out of 100 children, did not receive any counselling related to immunisation.* Only 41 children were reported to have received immunisation counselling, indicating that less than half the sample was covered by such services.

The data reveals that more than half of the children’s caregivers lacked access to immunisation counselling, which is a critical component of preventive healthcare. The limited outreach and awareness may contribute to lower immunisation uptake and greater health vulnerabilities among young children in the study area. Strengthening health communication and counselling services is essential to improve immunisation coverage and better child health outcomes.

Figure 5.4d: Number of children between two and six years of age who received counselling on food habits from AWC or ICDS



This horizontal bar chart shows a significant majority – 71 out of 100 caregivers – did not receive any counselling on food habits. This reflects a substantial gap in nutritional education and outreach. Only 29 caregivers reported receiving counselling on appropriate food habits for their children. The data highlights a critical shortfall in dietary and nutrition counselling. This lack of nutritional awareness and education may contribute to poor feeding practices and undernutrition, underlining the urgent need to strengthen behaviour change communication and counselling services within child development programs.

Table 5.5 Number(Percentage) of children between the ages of two and six years who received micronutrient and preventive supplementation from community health workers

	Received	Did not receive	Do not know	Total
Vitamin A (last 6 months)	36 (36.0%)	64 (64.0%)	0	100
Deworming tablets/ syrup	40 (40.0%)	57 (57.0%)	3 (3.0%)	100
Iron tablets/ Syrup/ sprinkle	23 (23.0%)	77 (77.0%)	0	100

The data highlights significant gaps in the coverage of key child health interventions over the past six months. *Only 36% of children received Vitamin A supplementation, and 40% were given deworming tablets or syrup, while a concerning 64% and 57% of children, respectively, missed these critical preventive measures.*

Moreover, *only 23% of children received iron supplementation, pointing to widespread deficiencies in anemia prevention efforts.* The lack of awareness among caregivers was minimal, with only 3% unsure about deworming intake, suggesting that the issue lies more in service delivery and access rather than awareness.

These figures indicate an urgent need for improved coordination with frontline health services and community outreach to ensure regular, universal access to micronutrient supplementation and deworming—particularly in climate-vulnerable areas like the Sundarbans where children's nutritional vulnerabilities are compounded by environmental risks.

The data is drawn from community-level health service outreach during specific time frames prior to the survey.

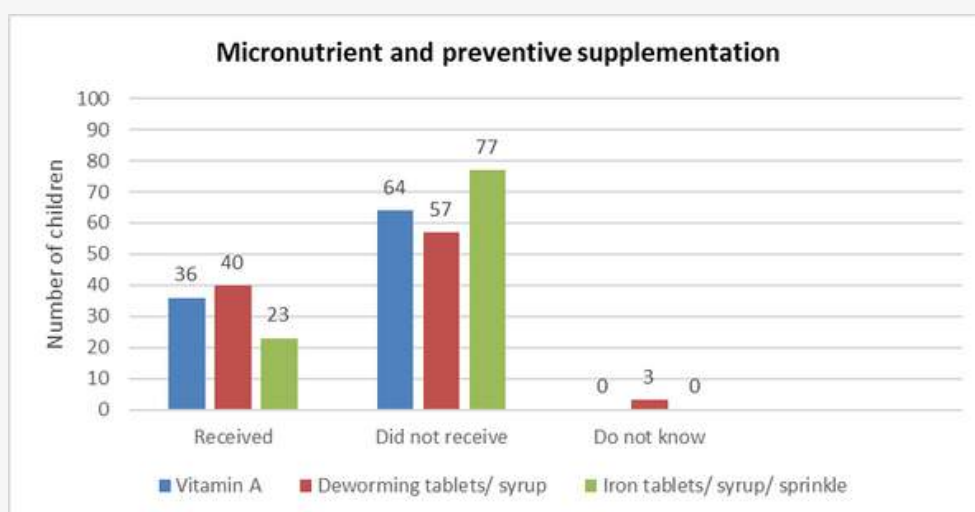


Figure 5.5 Number (Percentage) of children between the ages of two and six years who received micronutrient and preventive supplementation from community health workers

The figure 5.5 presents data on the number of children who received or did not receive three critical health interventions: Vitamin A supplementation, deworming tablets or syrup, and iron supplements (in the form of tablets, syrup, or sprinkles).

Vitamin A Supplementation

Vitamin A is essential for immune function, vision, and overall child growth. However, supplementation coverage shows significant gap. Out of the 100 children surveyed, 36 children had received Vitamin A supplementation in last six months. 64 children had not received the supplement.

Deworming Tablets or Syrup

Deworming is a preventive public health measure to control parasitic infections that can impair nutrition and cognitive development. The data shows that 40 children received deworming medication in preceding six months. 57 children did not receive any deworming treatment.

Iron Supplementation

Iron supplementation, especially in the form of tablets, syrups, or micronutrient sprinkles, is the key to preventing childhood anaemia. Only 23 children received iron supplements. A large majority, 77 children, did not receive any iron in the form of tablets, syrup, or sprinkles. Given the high prevalence of iron-deficiency anaemia in young children in India, particularly in West Bengal, this data underscores a major gap in the delivery of essential nutritional support.

These findings indicate that strengthening the ICDS and primary healthcare infrastructure is essential to ensure that these vital interventions reach all children, especially in vulnerable and underserved communities.

Dietary diversity of children

Table 5.6 Number (Percentage) of children who had eaten/drunk the mentioned food items during 24 hours preceding the survey

	Has eaten/drunk- Overall	Total
Any juice/ soup	17 (17.0%)	100
Any milk (tinned/ fresh/ powder)	16 (16.0%)	100
Any commercially fortified baby	3 (3.0%)	100
Any other liquid food	16 (16.0%)	100
Any food item made from grains	97 (97.0%)	100
Any yellow or orange food item	49 (49.0%)	100
Any food item made from roots	97 (97.0%)	100
Dark green leafy vegetables	64 (64.0%)	100
Any fruits (ripe mangoes/	44 (44.0%)	100
Any organ meat	15 (15.0%)	100
Any other birds' meat	18 (18.0%)	100
Any other meat	0 (0.0%)	100
Eggs	56 (56.0%)	100
Fresh/dried/shell fish	52 (52.0%)	100
Beans/peas/lentil s/nuts	53 (53.0%)	100
Cheese or any food item made	12 (12.05)	100
Any other solid, semi- solid, or	12 (12.0%)	100
Any prescribed vitamin dose/	5 (5.0%)	100
Any prescribed iron pills/ syrup	5 (5.0%)	100
Any prescribed medicine for	3(3.0%)	100

The table 5.6 analyses the types and diversity of food and supplements consumed by children in the 24 hours preceding the survey.

Liquid Foods and Milk Consumption

The consumption of liquid foods (juice, soup, milk, or other liquids) was generally low in both villages. *Only 17% of children consumed juice or soup, and 16% had milk (tinned, fresh, or powdered).* Just 3% of children consumed commercially fortified baby food such as Cerelac or Farex. Similarly, 16% had other liquid foods, indicating limited intake of nutrient-rich fluids beyond water or basic meals.

This reflects limited access to – or affordability of – nutrient-dense liquids and fortified food products. The reasons for the lack of intake of milk or milk related products would be because of frequent cyclones after Ayla, the cows and goats were swept away with flood water and due to lack of purchasing power, people stop rearing livestock, particularly in Ghoramara.

Staple Grains and Cereal-Based Foods

A very high proportion of children (97%) consumed grain-based items such as bread, roti, rice, chapatti, noodles, biscuits, or idly, reflecting the dominance of staple cereals in children's diets. Root-based foods like potatoes and yams were also consumed by 97%, showing their importance as a carbohydrate source.

Vegetables and Fruits

Dark green leafy vegetables were consumed by 64% of children, suggesting moderate access to micronutrient-rich plant-based foods. Yellow or orange vegetables such as pumpkin, carrot, and squash were consumed by 49%, while fruits like ripe mangoes and papayas were eaten by 44% of the children, indicating room for improvement in vitamin A-rich food consumption. *In Ghoramara, during the focus group discussion, the mothers or caregivers of the children told that— When someone visits Kakdwip, he purchases fruits such as mangos and lemons. Otherwise, we don't eat the fruit. There are no fruits available here.*

Animal-Based Foods

Eggs were consumed by 56% of the children, making them the most common animal protein source. Shellfish and other fish were eaten by 52%, showing significant reliance on aquatic protein. Chicken or duck was consumed by 18%, while organ meats were reported by 15%.

Plant-Based Proteins and Dairy Products

Beans, peas and lentils were consumed by 53% of children, representing a relatively strong presence of plant-based proteins in their diets. Only 12% consumed cheese or other milk-based food items, suggesting limited access to processed or nutrient-rich dairy alternatives. *This reflects a low intake of milk-based proteins, further underscoring nutritional vulnerabilities related to protein quality.*

Other Solid, Semi-Solid Foods and Supplements

Just 12% had consumed other solid, semi-solid, or soft foods, indicating low dietary diversity beyond the staple items.

Only 5% of children received prescribed vitamin supplements, and another 5% received iron pills or syrups. Deworming medication was administered to merely 3%, pointing to extremely low coverage of essential health supplements and preventive care. The limited use of prescribed micronutrient supplements and medications suggests weak links between health services and household-level nutritional practices.

During the focus group discussions, mothers shared insights into their children's daily food habits, revealing patterns that reflect underlying socio-economic vulnerabilities and persistent food insecurity. *Most children begin their day with biscuits, a low-nutrient, inexpensive option often used to suppress hunger in resource-poor households. This is followed by midday meals from ICDS, typically limited to khichri or plain rice, which lack dietary diversity. Occasionally, children consume fish or vegetables in the afternoon, but this is not consistent. Eggs are used as a substitute for infants or children unable to eat fish, indicating both limited protein options and affordability constraints. In the evening, biscuits are again a common snack, and dinner usually consists of rice, dal and vegetables.*

These dietary patterns reflect a heavy reliance on carbohydrate-based meals, with limited consumption of protein-rich or micronutrient-dense foods. Such food insecurity stems from economic constraints and climate-induced agricultural challenges, highlighting the urgent need for targeted nutritional interventions to address malnutrition in the region.

Table 5.7 Percentage of children who had eaten/drunk the mentioned food items at least twice or more times during 24 hours preceding the survey

	Has eaten/ drunk- Overall	Total
Cereals and potatoes	92 (92.0%)	100
Pulses and nuts	0 (0.0%)	100
Fish, meat	59 (59.0%)	100
Eggs	56 (56.0%)	100
Milk & dairy products	4 (4.0%)	100
Yellow/orange fruits	24 (24.0%)	100
Green, leafy vegetables	6 (6.0%)	100
Other fruits or vegetables	3 (3.0%)	100

Note: For fish, meat, and egg one or more time have been considered instead of twice and more.

The above table evaluates the quality of dietary intake based on how often key food groups were consumed by children within a 24-hour period prior to the survey. While most nutritional guidelines emphasize diversity, the frequency of intake—especially of nutrient- dense foods—is equally critical for addressing under-nutrition.

Cereals and Potatoes

A very high percentage of children (92.0%) consumed cereals and potatoes at least twice during the recall period, indicating these are staple components of their daily meals.

Pulses and Nuts

Interestingly, no child from either village consumed pulses or nuts twice or more during the recall period because both the study areas do not produce pulses. They have to buy the pulses from outside. This reflects a critical dietary gap, especially in plant-based protein sources that are vital for growth and muscle development, and are typically affordable alternatives to meat or dairy. It may indicate household's low purchasing power, lack of dietary awareness, or cooking preferences that do not incorporate repeated consumption.

Fish, Meat, and Eggs

The intake of protein-rich food groups shows considerable variation. Fish and meat were consumed by 59.0% of the children, and eggs by 56.0% (albeit, at least once in a day), suggesting moderate consumption of animal-based proteins.

Milk and Dairy Products

Milk and dairy product intake was notably low, *with only 4.0% of children meeting the consumption frequency criteria. The absence of repeated dairy consumption reveals a serious nutritional gap, particularly considering dairy's contribution to calcium, vitamin D, and protein intake in early childhood.* In the Focus Group Discussion in Ghoramara, mothers reported that because of frequent cyclonic events in the recent past, they lost cows, goats etc. So, they have stopped rearing these cattle.

Fruits and Vegetables

When it comes to fruits and vegetables, only 24.0% of the children consumed yellow or orange fruits twice or more, which are vital sources of Vitamin A. Consumption of green leafy vegetables (6.0%) and other fruits and vegetables (3.0%) was also alarmingly low, suggesting a deficiency in essential vitamins and minerals from plant-based sources.

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Table 5.8 Mean dietary scores (MDS) (out of eight food-groups) and percentage satisfying recommended minimum dietary diversity (MDD) (at least four food-groups) according to the norm of Infant and Young Child Feeding Practices (IYCF) during 24 hours preceding the survey

	Mean Dietary Score (MDS)	Minimum Dietary Diversity (MDD)	Total
Total mean score (percentage)	2.44 (1-5) *	15 (15.0%)	100

Note: For fish, meat, and egg one or more time have been considered instead of twice and more, *parenthesis indicates range

The Mean Dietary Score (MDS) and Minimum Dietary Diversity (MDD) are crucial indicators used to assess the nutritional quality of children's diets. The MDS reflects the average number of food groups consumed, while the MDD captures the proportion of children who consumed at least four of the eight recommended food groups, as per the Infant and Young Child Feeding (IYCF) guidelines. These indicators provide insights into both the variety and adequacy of children's diets in the studied regions.

The Mean Dietary Score (MDS) was 2.44, with individual scores ranging from 1 to 5 out of a possible 8 food groups. This average suggests that most children consumed food from fewer than three different food groups, reflecting extremely limited dietary diversity. The Minimum Dietary Diversity (MDD)—defined as the consumption of at least four food groups—was met by only 15% of the children. This is significantly below the recommended threshold for ensuring adequate nutrient intake and points to widespread nutritional inadequacy in the children's diets.

The average suggests that most children consumed food from fewer than three different food groups, reflecting extremely limited dietary diversity. The Minimum Dietary Diversity (MDD)—defined as the consumption of at least four food groups—was met by only 15% of the children. This is significantly below the recommended threshold for ensuring adequate nutrient intake and points to widespread nutritional inadequacy in the children's diets.

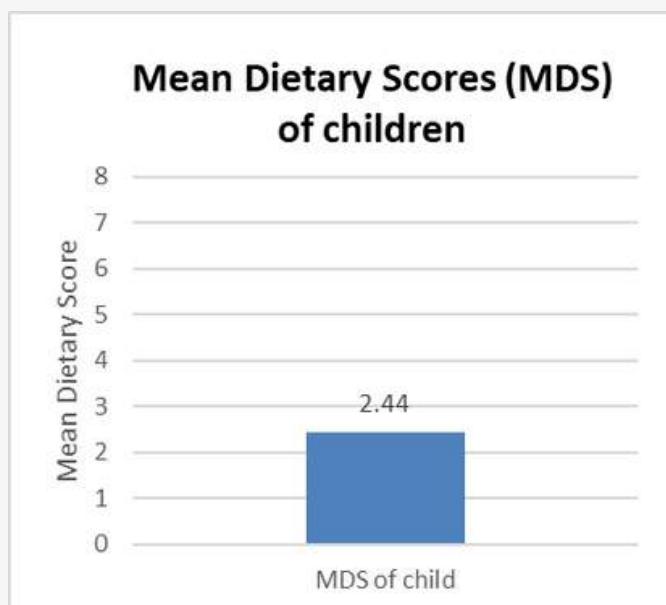


Figure 5.8a: MDS out of eight food groups of the child

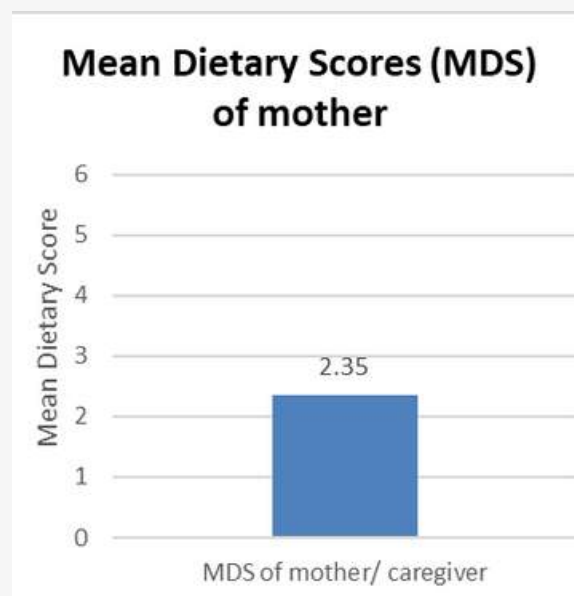


Figure 5.8b: MDS out of six food groups of the mother

The low MDS and MDD may reflect limited food availability, poor access to nutritional programs, or inadequate knowledge of the caregivers. Targeted interventions such as nutrition education, improved food distribution, and strengthening ICDS or Anganwadi services are essential to address these dietary gaps. These findings reinforce the need to embed context-specific nutrition strategies within broader development initiatives in island regions like Rudranagar and Ghoramara, especially in light of their geographical and environmental vulnerabilities.

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Illness among the children

Symptoms	Overall (percentage)	Total
Only fever	15 (15.0%)	100
Only cough	4 (4.0%)	100
Acute respiratory infection	1 (1.0%)	100
Diarrhoea	5 (5.0%)	100
Eye-problem	1 (1.0%)	100
Mental illness	2 (2.0%)	100
Disability	2 (2.0%)	100
Other illnesses	4 (4.0%)	100

Table 5.9: Prevalence of symptoms of common childhood illnesses (as reported by the mothers/caregivers) during 15 days preceding the survey

Note: Other illnesses include common vomiting and skin problem

The above table 5.9 shows the understanding of the occurrence of common childhood illnesses which is essential for assessing child health conditions, identifying healthcare needs, and planning effective community health interventions. This table presents data on the self-reported symptoms of illness among children aged two to six years in Rudranagar and Ghoramara, based on caregiver recall of the 15 days prior to the survey.

Fever

Fever emerged as the most commonly reported symptom, with a total of 15 cases recorded, which may point to underlying issues such as viral infections or inadequate immunity possibly linked to poor nutrition and sanitation.

Cough and Acute Respiratory Infections

Cough alone was reported in 4 children. A single case of Acute Respiratory Infection (ARI) was noted.

Diarrhoea

Diarrhoeal symptoms were reported in 5 children. The greater frequency of diarrhoea could suggest unsafe drinking water, inadequate sanitation, or poor food hygiene, which warrant public health attention.

Other Reported Illnesses

Eye problems, mental illness, and disability were reported with one or two isolated cases each.

Eye problem: 1 case (100%)

Mental illness: 2 cases(100%)

Disability: 2 cases(100%)

These isolated reports, while not widespread, highlight the need for inclusive health screenings and targeted follow-up for children with special or chronic conditions in the area.

Other Illnesses

The category of “other illnesses,” which includes vomiting and skin problems, had 4 reported cases.

This suggests that such conditions are not location-specific and may be associated with general environmental or hygiene-related factors. Further, as the survey conducted in the middle of summer, the seasonality of morbidity can also affect the prevalence. Prevalence of common childhood morbidity is generally higher after the onset of rainy season.

During the focus group discussion at Rudranagar, the mothers of the small children reported that they have primarily noticed three types of health problems i.e. fever, diarrhoea, and skin rashes among the children following cyclones and floods and also during the hot and humid summer period.

During the focus group discussion at Rudranagar, the mothers of the small children reported that they have primarily noticed three types of health problems i.e. fever, diarrhoea, and skin rashes among the children following cyclones and floods and also during the hot and humid summer period.

Symptoms	Overall	Total	Average OOPE (in rupees)
Only fever	13	100	654
Only cough	4	100	295
Acute respiratory	1	100	1300
Diarrhoea	5	100	1010
Eye-problem	1	100	0
Mental illness	1	100	2000
Disability	1	100	500
Other illnesses	4	100	2000

Table5.10 Treatment-seeking behaviour and out of pocket expenditure (OOPE in rupees) of the reported common childhood illnesses

The above table examines how caregivers responded to common childhood illnesses by seeking treatment and the associated out-of-pocket expenditure (OOPE) incurred during the process.

Treatment for Fever

A total of 13 children received treatment for fever. The average OOPE for treating fever was Rs.654, indicating a moderate economic burden for families in both areas.

Treatment for Cough

Of the 4 children treated for cough. The average OOPE for cough was Rs.295, the lowest among all conditions reported, likely due to simpler or over-the-counter remedies.

Acute Respiratory Infection (ARI)

Only one case of ARI was reported, and the OOPE for this single treatment was notably high at Rs.1300.

The substantial cost suggests specialist consultation, expenses on travel, cost of medicines, and other incidental expenditure incurred during travel indicating the financial strain associated with more severe respiratory conditions.

Treatment for Diarrhoea

Five children received treatment for diarrhea. The average OOPE stood at Rs.1010, reflecting the cost of medication, rehydration therapy, and possibly diagnostic tests. Other Illnesses and Chronic Conditions.

Eye Problem: One treated case had no associated OOPE, possibly due to access to free services or home remedies.

Mental Illness: One treated case had a significantly high OOPE of Rs.2000, suggesting the need for specialised care or travel to urban health centres.

Disability: One case of disability was treated with an OOPE of Rs.500, which may have included basic aids or consultation.

Other Illnesses (vomiting, skin problems): Four cases had a high average OOPE of Rs.2000, likely reflecting complex treatment or reliance on private healthcare providers.

From the above results it can be inferred that OOPE was higher for chronic and non-communicable conditions, underscoring the economic vulnerability of families facing prolonged or specialist medical needs.

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	Underweight		Stunting		Wasting	
	Number	Percentage	Number	Percentage	Number	Percentage
Total						
Sex of the child						
Male	12	27.9	12	27.9	16	37.2
Female	23	40.4	16	28.1	23	40.4
Years of mother's/caregiver's education						
Up to 8 years	17	37	14	30.4	19	41.3
9-10 years	13	34.2	6	15.8	15	39.5
More than 10 years	5	31.3	8	50	5	31.3
Caste affiliation						
SC	9	40.9	10	45.5	10	45.5
ST	6	66.7	4	44.4	7	77.8
General/ OBC	20	29	14	20.3	22	31.9
Religion						
Hindu	32	38.6	26	31.3	35	42.2
Muslim	3	17.7	2	11.8	4	23.5
Household asset index						
Low	14	41.2	10	29.4	17	50
Medium	9	27.3	10	30.3	9	27.3
high	12	36.4	8	24.2	13	39.4

Table 5.11 Prevalence of underweight, stunting, and wasting (in per cent) according to mother's/ caregiver's and household background characteristics

The table (5.11) and following figures (5.11a-e) presents a comparative analysis of the prevalence of underweight, stunting, and wasting among children, segmented by household and maternal/caregiver characteristics, across the total combined sample.

Gender-wise Differences

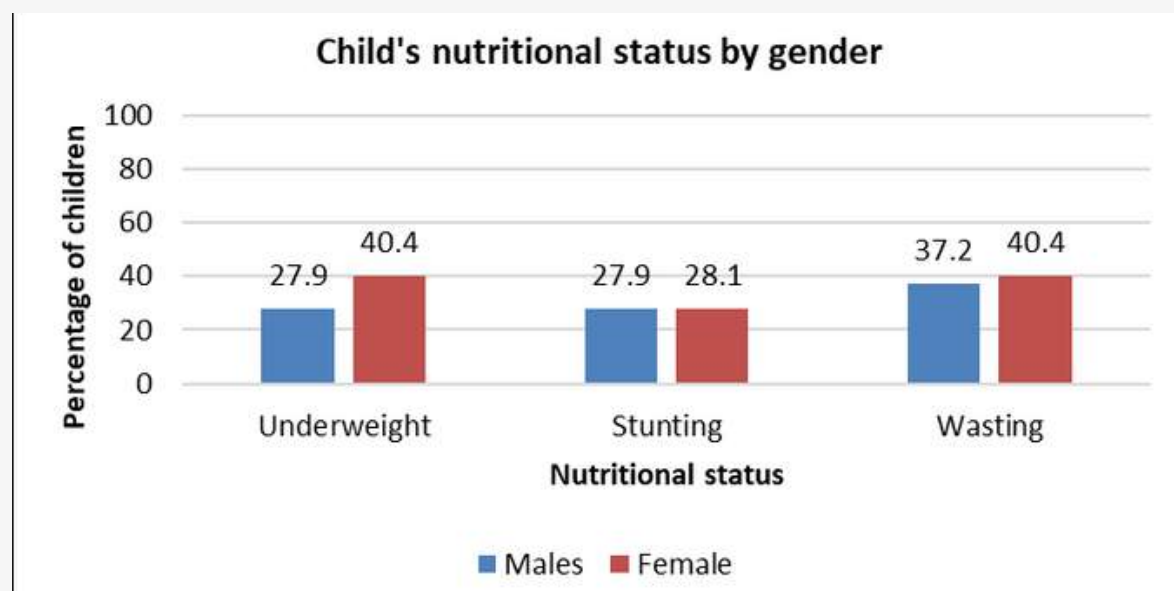


Figure 5.11a: Prevalence of underweight, stunting and wasting by gender of the child (in percentage)

Across the total sample, girls appear more vulnerable than boys. Underweight prevalence was higher among girls (40.4%) compared to boys (27.9%). Similarly, wasting was more common among girls (40.4%) than boys (37.2%). However, stunting showed minimal gender disparity (males: 27.9%; females: 28.1%).

Maternal Education and Child Nutrition

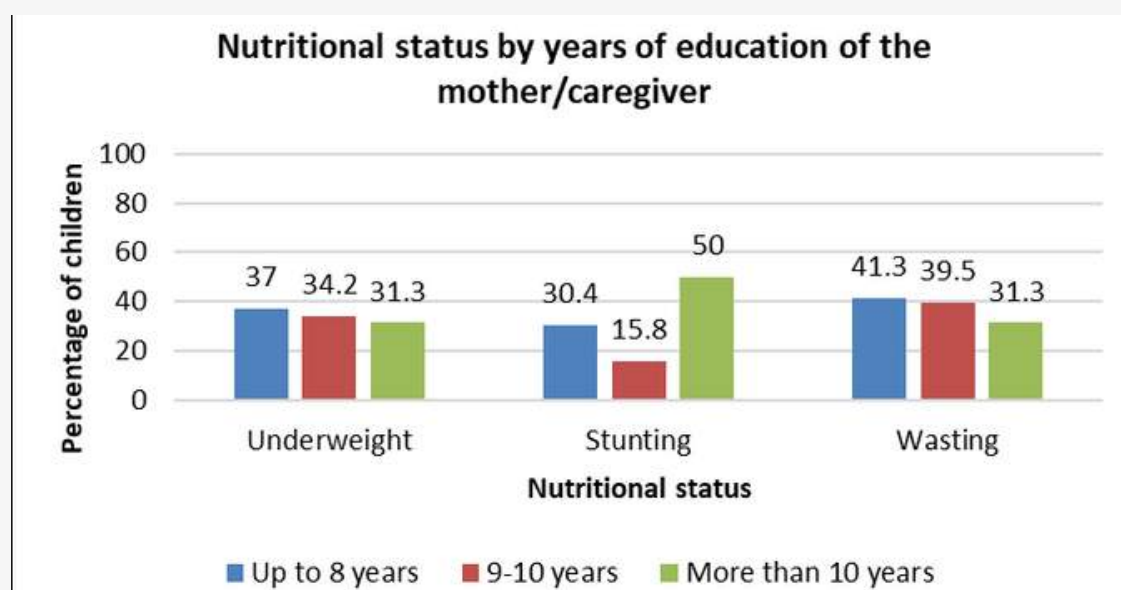


Figure 5.11b: Prevalence of underweight, stunting and wasting among the children (in percentage) by years of education of the mother / caregiver

The level of maternal or caregiver education shows a mixed influence on child nutrition. In the total sample, children of mothers with up to 8 years of education exhibited the highest prevalence of underweight (37.0%) and wasting (41.3%), while those with more than 10 years of education had lower rates of underweight (31.3%) and wasting (31.3%). Surprisingly, stunting was most prevalent (50.0%) among children whose mothers had more than 10 years of education, possibly due to a smaller sample size.

Caste Affiliation and Nutritional Outcomes

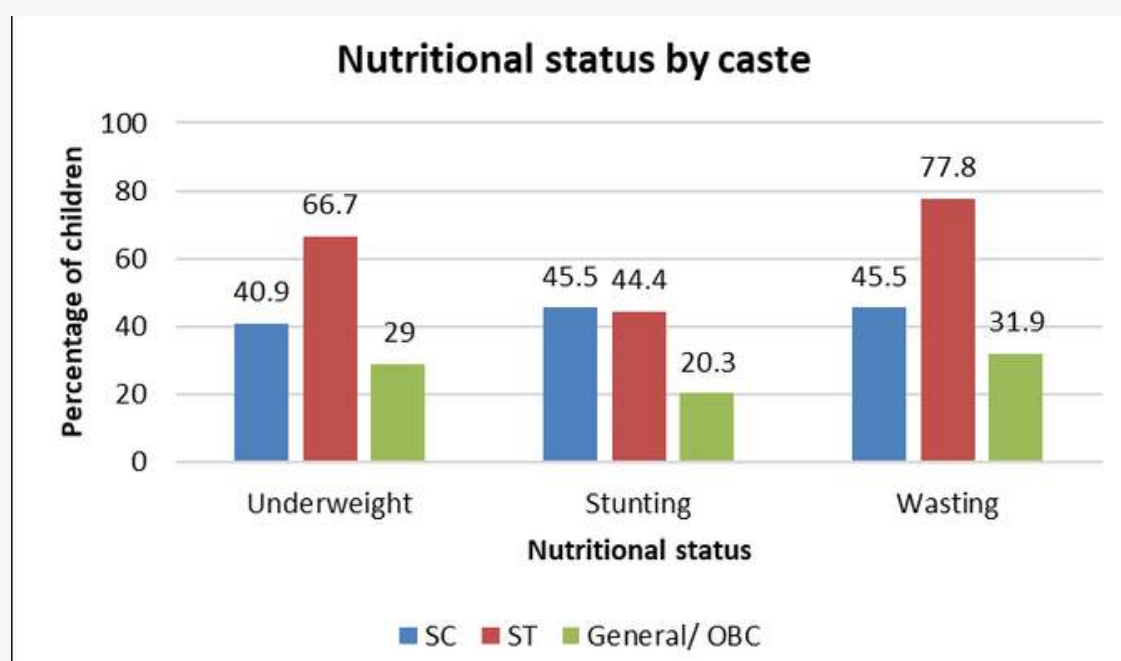


Figure 5.11c: Prevalence of underweight, stunting and wasting among the children (in percentage) by the caste of the mother/ caregiver

Children from Scheduled Tribes (ST) experienced the highest burden of under-nutrition. In the total sample, ST children had the highest prevalence of underweight (66.7%), stunting (44.4%), and particularly wasting (77.8%). Children from Scheduled Castes (SC) also displayed high levels—underweight (40.9%) and wasting (45.5%)—while OBC/General children fared relatively better across all indicators.

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Religion and Child Malnutrition

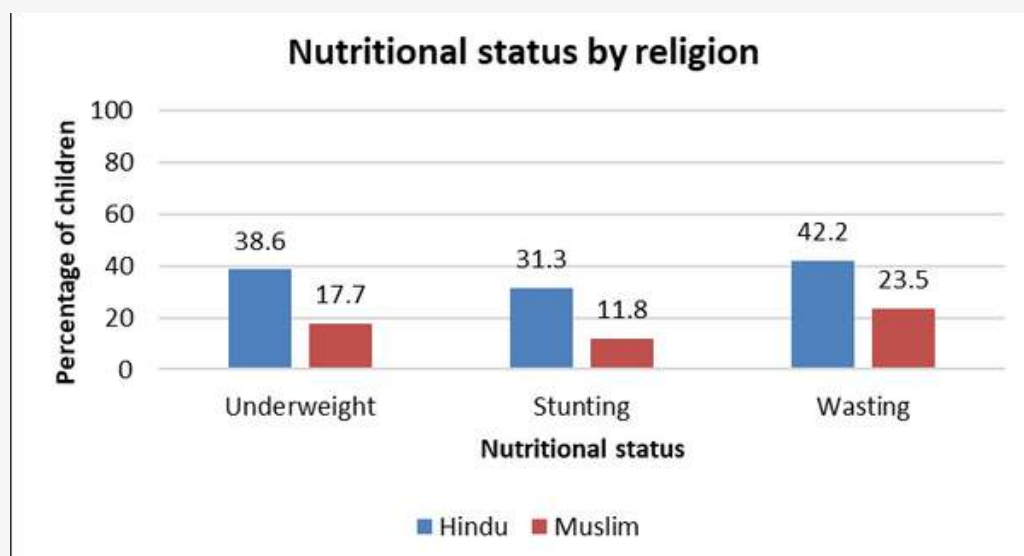


Figure 5.11d: Prevalence of underweight, stunting and wasting among the children (in percentage) by religion of the mother/ caregiver

Religion-based differences reveal that children from Hindu community were more affected in all three indicators than their Muslim counterparts across the total sample. Hindu children showed high rates of underweight (38.6%), stunting (31.3%), and wasting (42.2%), while these figures were 17.7%, 11.8%, 23.5% respectively among their Muslim counterparts. Qualitative evidences suggest that dietary pattern among Muslim children are different compared to their Hindu counterparts. Intake of non-vegetarian items (rich of animal protean) found to be markedly higher among children belonging to the Muslim households compared to children from Hindu community.

Household Asset Index and Nutritional Outcomes

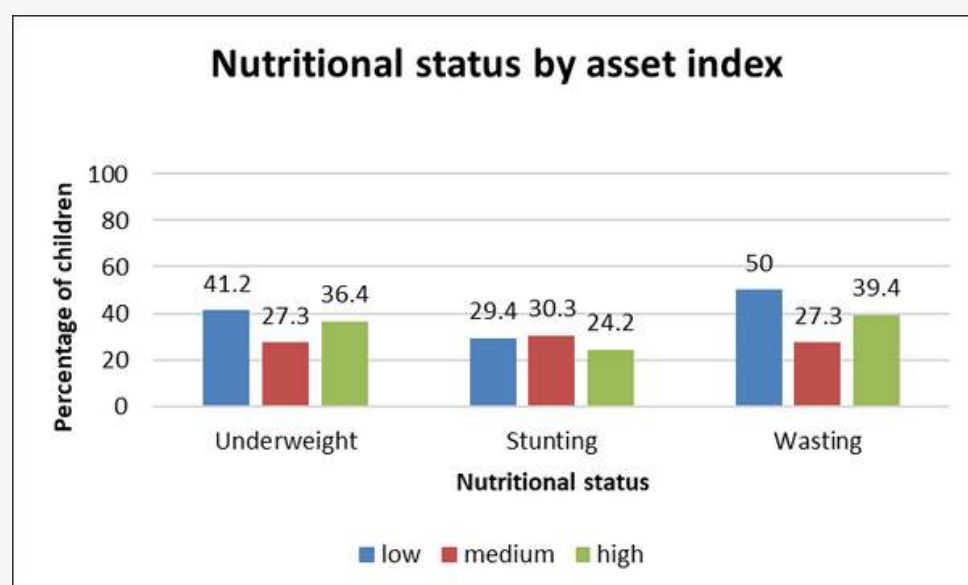


Figure 5.11e: Prevalence of underweight, stunting and wasting among the children (in percentage) by household asset index

Economic status, as reflected in the household asset index, had a notable correlation with child nutritional outcomes. In the total sample, children from low-asset holding households had the highest rates of underweight (41.2%) and wasting (50.0%). Those in medium and high-asset holding households showed better outcomes, though some inconsistency exists— particularly with wasting, which was also high in high-asset holding households (39.4%).

Personal hygiene of children and household member

	Rudranagar		Ghoramara		Total
Indicators	Number	Percentage	Number	Percentage	Number and Percentage
Tobacco smoking within household	34	68	5	10	39
Using soap/liquid soap after defecating by children	5	10	13	26	18
Using soap/liquid soap after defecating by other household members	38	72	27	54	65
Using soap/liquid soap before eating by children	32	64	32	64	64
Using soap/liquid soap before eating by other household members	0	0	7	7	7
Safe disposal of child's feces	46	92	44	88	90

This table on page 82 presents data on various indicators of personal hygiene practices among children and other household members in the villages of Rudranagar and Ghoramara, as well as the combined total.

Tobacco Smoking Within the Household

A significantly higher percentage of households in Rudranagar (68%) reported tobacco smoking within the household environment compared to Ghoramara (10%). Overall, 39 households reported tobacco use indoors.

Use of soap/liquid soap after defecation by children

The practice of using soap or liquid soap after defecation among children was notably low in both areas — only 10% in Rudranagar and 26% in Ghoramara, making a total of 18 children practicing this hygienic habit.

Use of soap/liquid soap after defecation by other household members

Among other household members, 72% in Rudranagar and 54% in Ghoramara reported using soap after defecation. Combined, 65 households adhered to this hygienic practice.

Use of soap/liquid soap before eating by children

An equal percentage (64%) of children in both Rudranagar and Ghoramara reportedly used soap or liquid soap before eating.

Use of soap/liquid soap before eating by other household members

This practice was almost entirely absent in Rudranagar and only slightly present in Ghoramara (7%).

Safe disposal of child’s feces

This important hygiene behavior was practiced by 92% of households in Rudranagar and 88% in Ghoramara, with a total of 90 households demonstrating proper disposal of children’s feces.

Some hygiene practices like the safe disposal of child feces and children washing hands before eating were relatively well-practiced. Tobacco smoking indoors was significantly higher in Rudranagar, indicating a potential risk to child and household health. These findings suggest an urgent need for awareness and behavior change programs targeting hygiene practices in these communities.

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Dietary diversity of mothers/ caregivers

Total (number and percentage)	Daily	Weekly	Occasionally	Never	Total
Pulses and beans	4 (4.0%)	32 (32.0%)	61 (61.0%)	3 (3.0%)	100
Milk & dairy products	5 (5.0%)	8 (8.0%)	57 (57.0%)	30 (30.0%)	100
Yellow/orange fruits	2 (2.0%)	3 (3.0%)	80 (80.0%)	15 (15.0%)	100
Green, leafy vegetables	18 (18.0%)	50 (50.0%)	32 (32.0%)	0	100
Egg	3 (3.0%)	34 (34.0%)	61 (61.0%)	2 (2.0%)	100
Fish	49 (49.0%)	27 (27.0%)	24 (24.0%)	0	100
Meat	0 (0.0%)	18 (18.0%)	81 (81.0%)	1 (1.0%)	100
Fried food	4 (4.0%)	11 (11.0%)	80 (80.0%)	5 (5.0%)	100
Aerated drinks	0 (0.0%)	1 (1.0%)	68 (68.0%)	31 (31.0%)	100

Table 5.13: Numbers (percentages) of mothers/ caregivers consuming specific food groups

Table 5.13 provides insights into the dietary habits of mothers or caregivers by showing how frequently they consume specific food groups—categorized as daily, weekly, occasionally, or never. The data reveal significant patterns in the nutritional intake of adult female caregivers, which can have direct implications on their health as well as the nutritional environment of their children.

Pulses and Beans

A majority of the respondents (61%) consume pulses and beans occasionally, while 32.0% consume them weekly. Only 4% reported daily consumption. A small fraction (3%) reported never consuming them. This indicates that although pulses and beans are included in the diet, their regular intake remains limited.

Milk and Dairy Products

Dairy consumption is particularly low, with only 5% of mothers consuming it daily and 8.0% weekly. A large proportion (57%) consume dairy only occasionally, and 30.0% never consume it at all. This suggests a significant gap in the intake of calcium and protein among caregivers.

During the focus group discussion at Ghoramara, the mothers reported that Mothers usually don't drink milk. If the milk is bought, the children eat it. If at anytime a mother falls ill, if the doctor says that the blood pressure has decreased, it is necessary to eat well, then milk may be given if needed. Otherwise, milk is not served in most of the houses.

During the focus group discussion at Rudranagar at Sagar Island, the mothers/caregivers informed us that- Those who have cows at home, they drink milk. In the past, most people had cows at home. Because of the previous cyclone Yaas, the cows and goats were flowed with flood water and after that those whose financial condition is relatively better, they can buy milk. Otherwise, milk is not consumed every day.

Yellow/Orange Fruits

Regular consumption of yellow/orange fruits is extremely low. Only 2% consume them daily, and 3% weekly. A substantial 80% consume them occasionally, while 15% never include them in their diets. These fruits are vital sources of Vitamin A, and their low intake reflects a potential micronutrient deficiency.

Green Leafy Vegetables

In contrast, green leafy vegetables are more commonly consumed. About 18% of respondents consume them daily, 50% weekly, and 32% occasionally. Notably, no respondent reported never consuming them, making this food group the most frequently consumed among those surveyed.

Eggs

Egg consumption is also moderate. While only 3% reported daily intake, 34% consume eggs weekly and 61% occasionally. Only 2% never consume eggs. This reflects occasional inclusion of animal protein in the diet.

Fish

Fish emerges as the most regularly consumed animal-source food. Nearly half of the respondents (49%) consume fish daily, 27% weekly, and 24% occasionally. No respondents reported never eating fish, suggesting its cultural and dietary significance in the region. At Rudranagar, the mothers said that those who have a pond eat fish twice a day. The rest have to buy fish. They eat fish maximum three days a week. Fish consumption is universal across both communities, with no one reporting never eating fish.

Meat

In contrast to fish, meat consumption is much less frequent. None of the respondents reported daily intake, and only 18% consume meat weekly. A vast majority (81%) consume it only occasionally, while 1% reported never consuming meat. This indicates that meat is not a regular part of the daily diet.

Fried Food

Though not a healthy option, fried food is widely consumed. While 4% reported daily intake and 11% weekly, the majority (80%) consume it occasionally, and 5% never consume it. This reflects occasional indulgence rather than routine consumption.

Aerated Drinks

Sugary and carbonated beverages are rarely consumed regularly. None of the respondents consume them daily, only 1% consume them weekly, and 68.0% consume them occasionally. Notably, 31% reported never consuming aerated drinks.

The dietary intake patterns of mothers and caregivers in both Ghoramara and Sagar Islands highlight a concerning trend of low dietary diversity, particularly in essential nutrient-rich food groups such as milk, pulses, eggs, and fruits. While green leafy vegetables and fish are relatively more accessible and frequently consumed, the limited and infrequent intake of other protein and micronutrient-rich foods underscores the food insecurity faced by many households. Contributing factors include economic constraints, post-cyclone livestock losses, and entrenched gender norms in intra-household food distribution.

These findings reflect deeper socio-economic vulnerabilities, where caregivers often prioritize children's needs over their own and resort to nutrient-poor diets due to affordability and availability challenges. Addressing these gaps through targeted nutrition education, behavior change communication, and improved access to locally available, nutrient-dense food options is essential for breaking the intergenerational cycle of undernutrition and building resilience in these climate-affected island communities.

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Table 5.14 Mean dietary scores (MDS) (out of six food-groups) and percentage satisfying recommended minimum dietary diversity (MDD) (at least four food-groups) according to the norm during seven days preceding the survey among mothers/caregivers

	Mean dietary scores (MDS)	Minimum dietary diversity (MDD)	Total
Total mean score Total number	2.35 (0-6)	18 (18.0%)	100

Note: Fried food and aeriated drinks are excluded; while fish and meat have been clubbed together, parenthesis indicates range

The above table evaluates the dietary diversity among mothers and caregivers in Rudranagar and Ghoramara using the Mean Dietary Score (MDS) and the percentage meeting the Minimum Dietary Diversity (MDD), which is defined as consumption from at least four food groups during the seven days preceding the survey.

Mean Dietary Score (MDS)

The total mean dietary score across both islands stands at 2.35 (± 1.28) out of a possible 6, reflecting a generally low level of dietary variety among mothers and caregivers across the study sites.

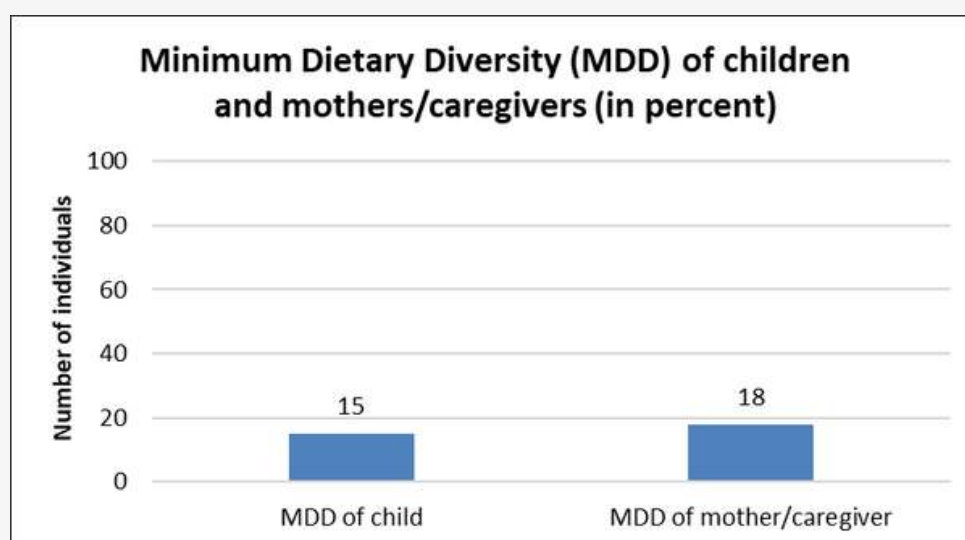


Figure 5.14: Minimum dietary diversity (at least four food-groups) of the mothers/ caregivers and minimum dietary diversity (at least four groups) of the child

This bar chart compares the Minimum Dietary Diversity (MDD) of children and their mothers or caregivers, expressed as a percentage of individuals who met the recommended minimum threshold. MDD is an important indicator of diet quality and nutritional adequacy, defined as the consumption of food from at least four different food groups within the previous 24 hours.

MDD of Children

Only 15% of children met the minimum dietary diversity requirement. This indicates that a vast majority (85%) of the children did not consume food from at least four different food groups, suggesting poor dietary quality and a potential risk of nutrient deficiencies.

MDD of Mothers/Caregivers

A slightly higher proportion of mothers/caregivers (18%) achieved the minimum dietary diversity, yet the percentage remains critically low. This implies that 82% of mothers/caregivers also had inadequate dietary diversity in their recent food intake.

FGDs in the study are reported adherence to food habit is traditionally ingrained. In both the study areas, the everyday morning breakfast of the mothers is only one biscuit and then Panta (water-soaked rice) with Alusedhoo (boiled potato). At noon they generally eat rice, dal, vegetables and fish. At night also they eat rice with Alusedhoo. So, this is probably one of the reasons for non-adherence to recommended MDD norms among mothers/caregivers.

Nutritional status of the mothers/ caregivers

BMI (kg/m ²)	Overall	Percentage
<18.5 (underweight)	38	38.00%
18.5–24.5 (normal)	48	48.00%
>24.5 (overweight)	14	14.00%
TOTAL	100	

Table 5.15 Nutritional status (as measured in terms of Body Mass Index (BMI)) of the mothers/ caregivers in the sample

The table 5.15 is about the Nutritional Status of Mothers/Caregivers Based on Body Mass Index (BMI). The Body Mass Index (BMI) is a key indicator of nutritional status, reflecting whether an individual is underweight, within a normal range, or overweight. The analysis of BMI among mothers and caregivers in Rudranagar and Ghoramara provides critical insights into the prevalence of under-nutrition and over-nutrition across the two island communities.

Underweight (BMI < 18.5)

A total of 38 individuals, accounting for 38% of the sample, were classified as underweight. This indicates a significant prevalence of undernutrition among the adult female population, potentially affecting their overall health, caregiving capacity, and susceptibility to illness.

Normal Weight (BMI 18.5–24.5)

A majority of the respondents (48 in total) fell within the normal BMI range, indicating relatively adequate nutritional status. This category includes the largest proportion of respondents overall.

Overweight (BMI > 24.5)

Only 14 individuals were found to be overweight. This indicates that overnutrition and related health risks such as obesity are not yet widespread in this population.

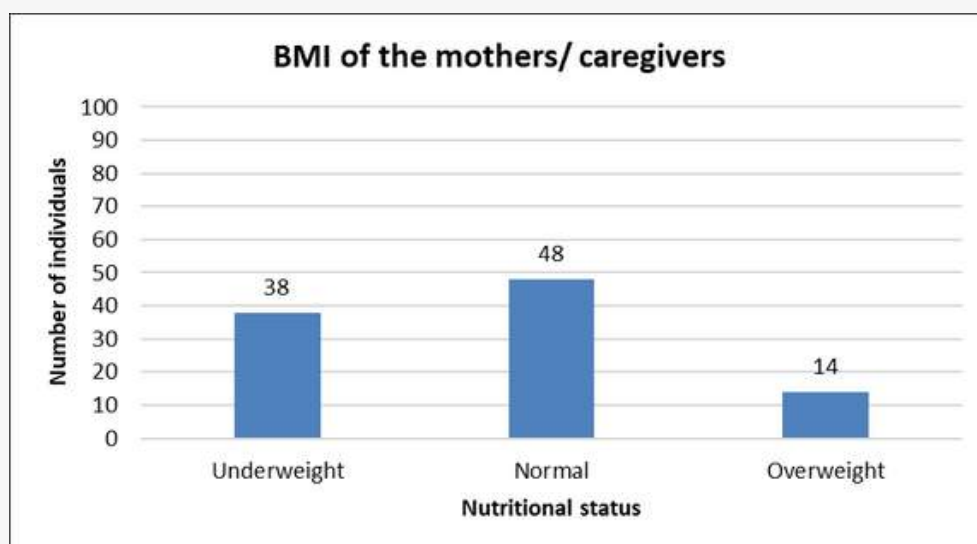


Figure 5.15: Nutritional status (as measured in terms of Body Mass Index (BMI)) of the mothers/ caregivers in the sample

This bar chart on page 89 illustrates the Body Mass Index (BMI) distribution among the mothers or caregivers of the surveyed children, categorizing their nutritional status into three groups: Underweight, Normal, and Overweight.

The majority of the mothers/caregivers (48 individuals) fall within the normal BMI range, indicating that nearly half of the sample had a healthy weight status.

A substantial number (38 individuals) were underweight, representing a significant proportion of the sample and suggesting a notable burden of undernutrition among adult female caregivers. Only 14 individuals were overweight, indicating that overweight/obesity is relatively less prevalent in this population. It suggests a shift towards excess fat intake among some sections of the population. This might be due to the higher intake of carbohydrates in the form of panta and aluseddho (boiled potato).

		Number - Overall	Percentage
Years of mother's/caregiver's education			
Up to 8 years		18	47.37
9-10 years		13	34.21
More than 10 years		7	18.42
Caste affiliation			
SC		6	15.79
ST		4	10.53
General/ OBC		28	73.68
Religion			
Hindu		28	73.68
Muslim		10	26.32
Household asset index			
low	15	39.47	
Medium	11	28.95	
high	12	31.58	

Table 5.16 Prevalence of underweight among mother's/caregivers' (in per cent) according to mother's/caregiver's selected background characteristics

The table 5.16 analyses the prevalence of underweight (BMI <18.5) among mothers and caregivers in Rudranagar and Ghoramara, disaggregated by key socio-demographic and economic indicators including education, caste affiliation, religion, and household asset index. These factors provide insights into the structural and social determinants influencing nutritional outcomes among women in ecologically vulnerable island settings.

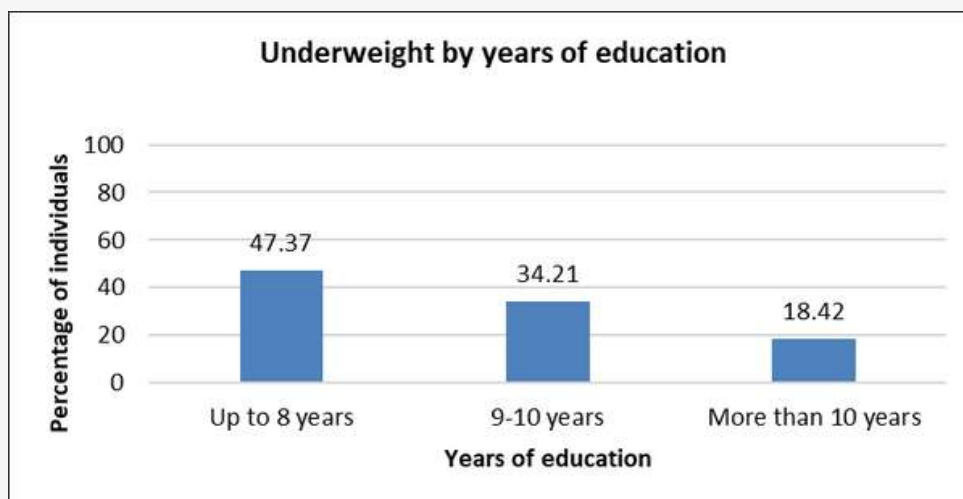


Figure 5.16a: Prevalence of underweight among the mothers/caregivers (in percentage) by years of education

Educational Attainment

Education appears to be inversely related to the prevalence of underweight status, although the pattern is not uniformly linear. Combined, among the 38 underweight mothers across both islands:

- 47.4% had up to 8 years of education
- 34.2% had 9–10 years
- 18.4% had more than 10 years

This suggests that lower educational attainment is associated with a higher likelihood of underweight status, likely due to poor nutritional awareness and reduced access to health-related information.

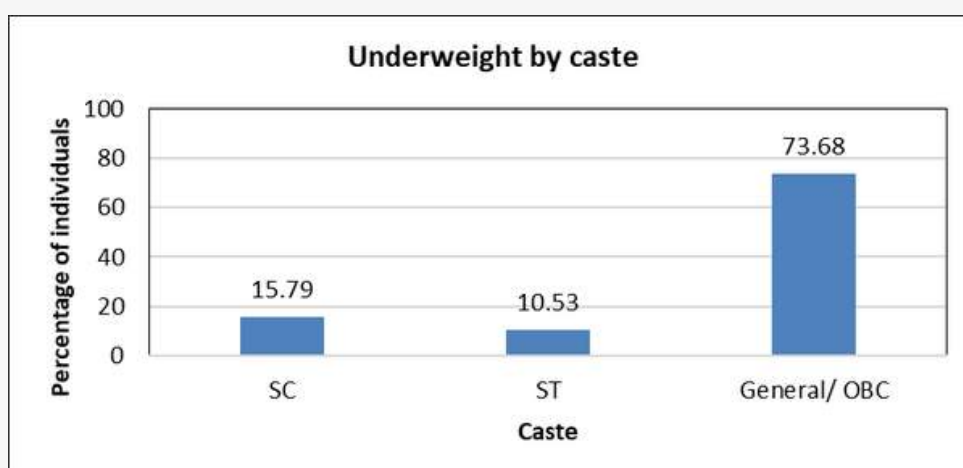


Figure 5.16b: Prevalence of underweight among the mothers/caregivers (in percentage) according to the Caste

Caste Affiliation

Caste-based disparities are clearly evident. Overall, out of the 38 underweight women:

- 73.7% belonged to General/OBC
- 15.8% were SC
- 10.5% were ST

General/OBC mothers show the highest share of under-nutrition overall, which may reflect class-based vulnerabilities not always aligned with caste identity.

Religious Affiliation

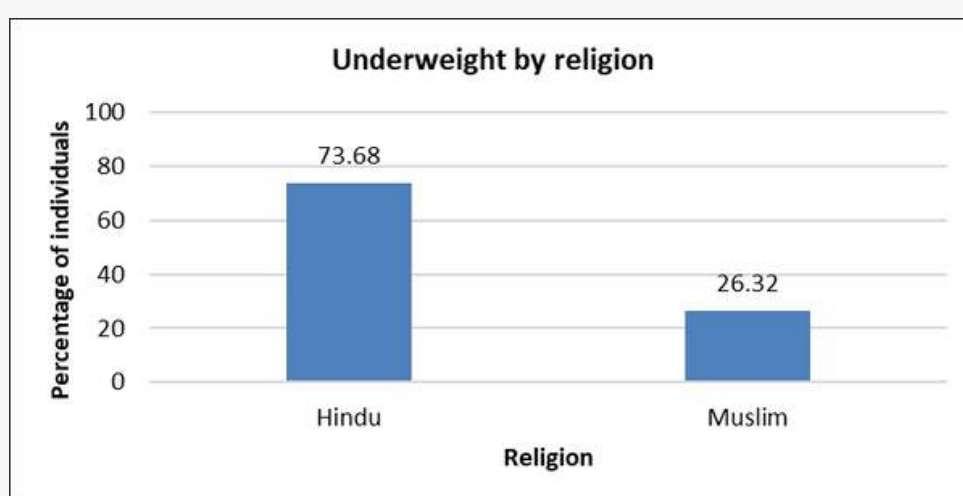


Figure 5.16c: Prevalence of underweight among the mothers/ caregivers (in percentage) according to their religion

Overall, 73.6% of underweight mothers were Hindus and 26.4% were Muslims. This variation largely reflects the need to explore religious and cultural factors in food access or healthcare- seeking behaviour more closely.

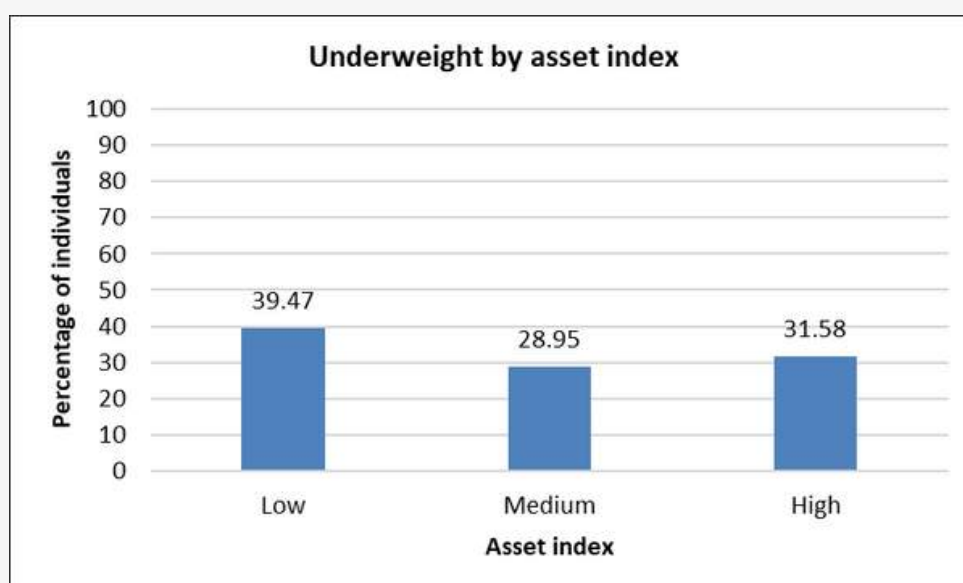


Figure 5.16b:Prevalence of underweight among the mothers/caregivers (in percentage) according to the Caste

Household Asset Index

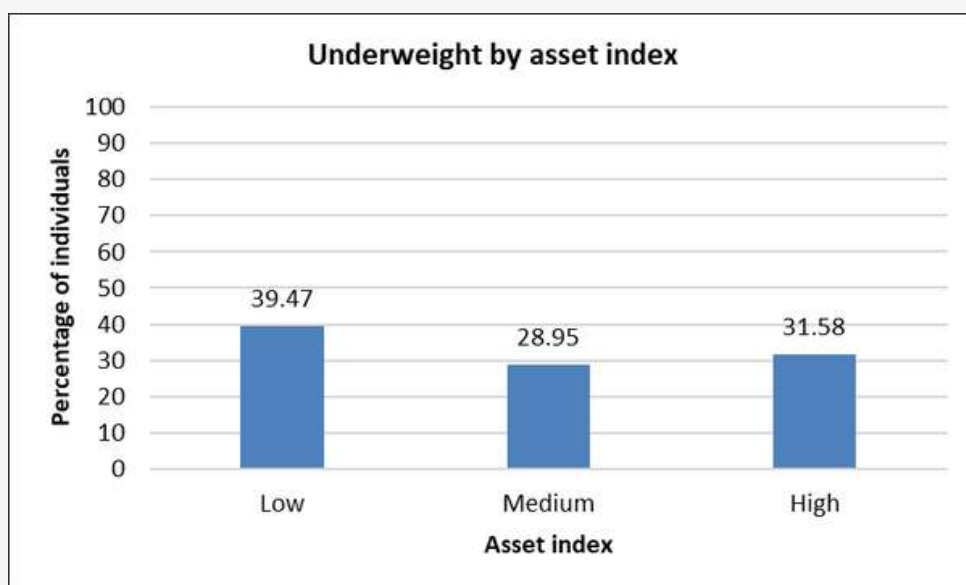


Figure 5.16d: Prevalence of underweight among the mothers/caregivers (in percentage) according to the household asset index

Economic status, as measured through the household asset index, shows a somewhat even distribution of underweight cases across asset groups.

Across both sites:

- 39.5% of underweight women belonged to low-asset holding households
- 31.6% to high-asset holding, and
- 29.0% to medium-asset holding households

This distribution shows no strong correlation between asset index and underweight prevalence, suggesting that economic status alone does not fully explain nutritional deficiency and the other social or environmental stressors may be influencing outcomes. Small sample size could be another reason.

Total						
	Child nutritional status					
Mother's/caregivers' nutritional status	Underweight		Stunted		Wasted	
	Number	Percentage	Number	Percentage	Number	Percentage
Underweight	14	40	13	46.4	16	41
Normal	20	57.1	10	35.7	21	53.9
Overweight	1	2.9	5	17.9	2	5.1

Table 5.17 Relationship between mothers/caregivers' nutritional status and nutritional status of their children

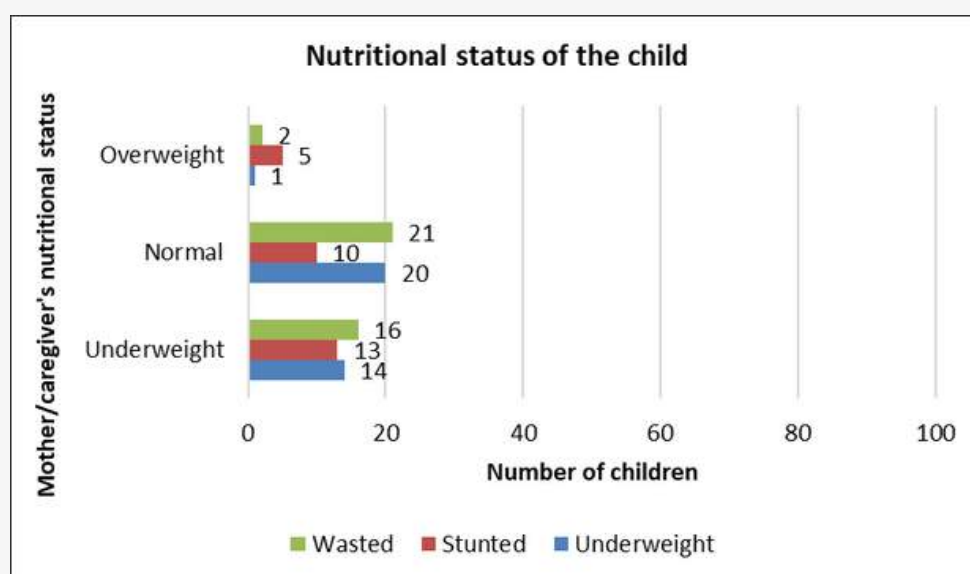


Figure 5.17: Prevalence of underweight, stunting and wasting among children according to their mother/caregiver's nutritional status

Table 5.17 and the above figure illustrate the relationship between the nutritional status of mothers/caregivers and that of their children in the two study areas— Rudranagar and Ghoramara —with a combined total also presented. The data is disaggregated into three child nutritional indicators: underweight, stunting, and wasting, cross-tabulated with maternal nutritional status categorized as underweight, normal, or overweight.

When the data from both regions are aggregated, it is understood that among children of underweight mothers, 40% were underweight, 46.4% stunted, and 41% wasted. Children of normal-weight mothers had better outcomes, though malnutrition was still present: 57.1% underweight, 35.7% stunted, and 53.9% wasted. Children of overweight mothers fared relatively better but still exhibited malnutrition: 2.9% underweight, 17.9% stunted, and 5.1% wasted.

Mental well being of mothers/caregivers

Psychological health status	Total					
	Anxiety		Stress		Depression	
	Number	Percentage	Number	Percentage	Number	Percentage
Normal	29	29	60	60	20	20
Mild	20	20	9	9	38	38
Moderate	21	21	14	14	19	19
Severe	15	15	11	11	10	10
Extremely severe	15	15	6	6	13	13
Any symptom	71	71	40	40	80	80

Table 5.18: Prevalence of anxiety, stress, and depression among mothers/caregivers (in per cent) in the study area seven days preceding the survey according DASS 21 (WHO)

Note: Cronbach alpha (a measure of scale reliability coefficient) for anxiety, stress, and depression was 0.67, 0.77, and 0.80 respectively

The table 5.18 presents the psychological health status of mothers and caregivers in Rudranagar and Ghoramara as measured by the Depression, Anxiety and Stress Scale (DASS21) developed by WHO. The assessment covered the seven days preceding the survey and categorised respondents into five levels of psychological distress: normal, mild, moderate, severe, and extremely severe. The reliability of the measurement scale, as indicated by Cronbach’s alpha, was 0.67 for anxiety, 0.77 for stress, and 0.80 for depression, suggesting acceptable to good reliability.

Across both islands the total sample is 100 (N = 100). Among them 71% of mothers exhibited some level of anxiety, with 15% experiencing extremely severe anxiety. 40% experienced some degree of stress, though only 6% reported extremely severe stress. 80% had symptoms of depression, of whom 13% experienced it at an extremely severe level.

This indicates that depression was the most prevalent condition, followed by anxiety, with stress being comparatively less reported but still significant.

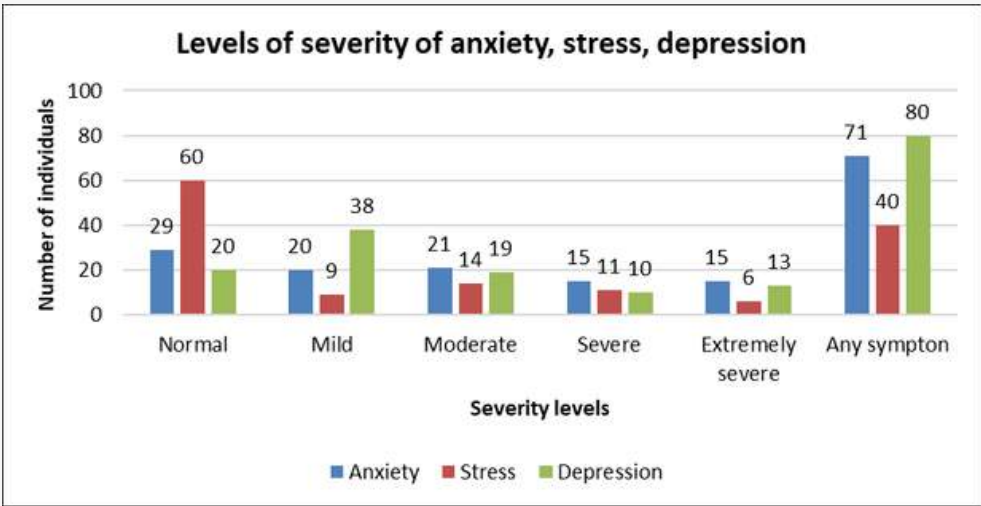


Figure 5.18a: Prevalence of the levels of anxiety, stress and depression among the mother/caregiver

Figure 5.18a illustrates the distribution of anxiety, stress, and depression symptoms among the mothers or caregivers in the study sample, categorized by severity levels. The chart presents data on the number of individuals experiencing varying degrees of mental health symptoms, including normal, mild, moderate, severe, and extremely severe levels, as well as the presence of any symptom related to anxiety, stress, or depression.

Among those classified as having normal mental health status, stress was the most common (60 individuals), followed by anxiety (29 individuals), and depression (20 individuals). This suggests a higher proportion of mothers/caregivers were free from stress-related symptoms compared to anxiety and depression.

Among those classified as having normal mental health status, stress was the most common (60 individuals), followed by anxiety (29 individuals), and depression (20 individuals). This suggests a higher proportion of mothers/caregivers were free from stress-related symptoms compared to anxiety and depression.

In the mild severity category, depression was most prevalent (38 individuals), indicating a relatively higher number of individuals experiencing early signs of depressive symptoms. Anxiety was reported in 20 individuals, while stress was least reported (9 individuals) in this category.

For the moderate severity level, anxiety was most frequently observed (21 individuals), closely followed by depression (19 individuals). Stress was reported in 14 individuals in this category.

In the severe category, 15 individuals experienced anxiety, 11 experienced stress, and 10 had depressive symptoms. This trend continues in the extremely severe category, where anxiety remained the most prevalent (15 individuals), followed by depression (13 individuals) and stress (6 individuals), suggesting anxiety symptoms were more likely to intensify in severity among the affected individuals.

Finally, considering the prevalence of any symptom—mild to extremely severe—across all three domains, depression affected the highest number of individuals (80), followed by anxiety (71) and stress (40). This highlights that while stress was most commonly reported at the normal level, fewer individuals showed elevated stress symptoms compared to anxiety and depression.

In summary, the data indicates chronic psychological distress, which could be attributed to environmental instability, poverty, caregiving burden, or limited mental health resources.

Background characteristics	Total					
	Any symptom of anxiety		Any symptom of stress		Any symptom of depression	
	Number	Percentage	Number	Percentage	Number	Percentage
Years of mother's/caregiver's education						
Up to 8 years	33	46.5	14	35	38	47.5
9-10 years	27	38	18	45	27	33.8
More than 10 years	11	15.5	8	20	15	18.8
Caste affiliation						
SC	16	22.5	11	27.5	19	23.8
ST	8	11.3	3	7.5	8	10
General/ OBC	47	66.2	26	65	53	66.3
Religion						
Hindu	60	84.5	40	100	67	83.8
Muslim	11	11.5	0	0	13	16.2
Household asset index						
Low	26	36.6	11	27.5	28	35
Medium	22	31	13	32.5	25	31.3
High	23	32.4	16	40	27	33.8

Table 5.19: Prevalence of any symptom of anxiety, stress, and depression among mothers/caregivers (in percent) in the study area seven days preceding the survey according DASS21 (WHO) according to mother's/caregiver's selected background characteristics

The above table analyses the prevalence of any symptoms of anxiety, stress, and depression among mothers/caregivers in Rudranagar and Ghoramara during the seven days preceding the survey, based on DASS21 (WHO) indicators. The analysis is structured by selected background characteristics, including education, caste, religion, and household asset index.

By Educational Level

Across the total sample, mothers with up to 8 years of education reported the highest prevalence of psychological symptoms: 46.5% reported anxiety, 35.0% stress, and 47.5% depression. The proportion declined with higher education. Among those with more than 10 years of education, only 15.5% reported anxiety, 20.0% stress, and 18.8% depression. This suggests that lower educational attainment is consistently associated with a higher prevalence of psychological distress, especially depression, in both areas. This could also be due to the fact that educated women may be careful in reporting such symptoms compared to their less educated counterparts.

By Caste Affiliation

Overall, General/OBC mothers reported the highest prevalence of all three symptoms—66.2% (anxiety), 65.0% (stress), and 66.3% (depression). This may reflect both the larger proportion of General/OBCs in the sample and higher exposure to stressors linked to socio-economic expectations or transitions.

By Religion

Hindu mothers constituted the majority of the sample, and accordingly, reported higher prevalence of symptoms overall: 84.5% (anxiety), 100% (stress), and 83.8% (depression). This reflects some variation in psychological symptom profiles between religious groups, particularly in Ghoramara, though sample distribution plays a role in shaping these patterns.

By Household Asset Index

Psychological distress did not show a linear trend with asset index. Across the total population, symptoms were slightly more prevalent in the low asset holding group: 36.6% reported anxiety, 27.5% stress, and 35.0% depression. However, high asset holding households were not exempted, with 32.4% anxiety, 40.0% stress, and 33.8% depression.

These findings suggest that psychological symptoms affect mothers across all economic strata, but types and intensities vary by context and perhaps expectations or vulnerabilities linked to each group. The data underscores a significant burden of mental health symptoms among mothers/caregivers in both Rudranagar and Ghoramara. While education level and caste affiliation appear to be the most consistent correlates of distress, psychological symptoms cut across religious and economic backgrounds as well. Interventions addressing maternal mental health should be sensitive to these social determinants and tailored to local contextual realities, especially focusing on low-education groups and General/OBC caste populations.

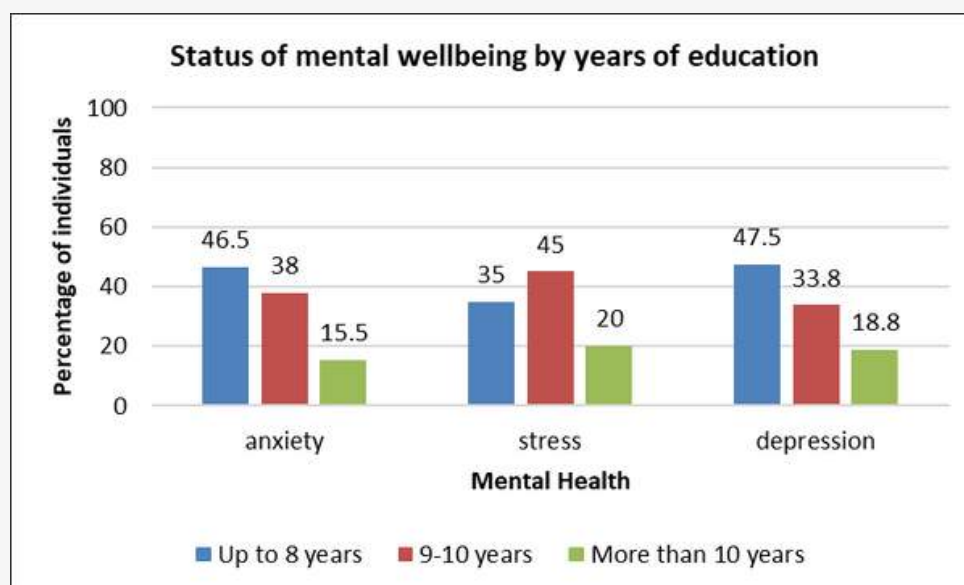


Figure 5.19a: Prevalence of anxiety, stress, and depression among the mothers/ caregivers (in percentage) according to their years of education

This figure presents the relationship between mothers'/caregivers' educational attainment and the prevalence of mental health symptoms—specifically anxiety, stress, and depression as per the DASS21 tool, across three education categories: up to 8 years, 9–10 years, and more than 10 years.

Anxiety- The highest prevalence of anxiety symptoms was reported among individuals with up to 8 years of education (46.5%). This was followed by those with 9–10 years of education (38%). Only 15.5% of individuals with more than 10 years of education reported anxiety, suggesting a significant decline with higher education levels.

Stress- Stress was most prevalent among those with 9–10 years of education (45%), slightly higher than those with up to 8 years (35%). Again, individuals with more than 10 years of education reported lower stress levels (20%).

Depression- Depression was most commonly reported among individuals with up to 8 years of education (47.5%). This was followed by 33.8% for those with 9–10 years of education, and 18.8% for those with more than 10 years of education.

The figure clearly indicates an inverse relationship between educational attainment and mental health symptoms. Mothers/caregivers with lower levels of education (up to 8 years) consistently reported higher levels of anxiety, stress, and depression. Anxiety and depression are more prevalent than stress across all educational levels. In contrast, those with more than 10 years of education had significantly lower prevalence across all three mental health categories. This trend suggests that higher education may serve as a protective factor for mental wellbeing among mothers/caregivers. The depressive symptom burden is highest among the least educated, indicating urgent need for targeted mental health interventions in this group.

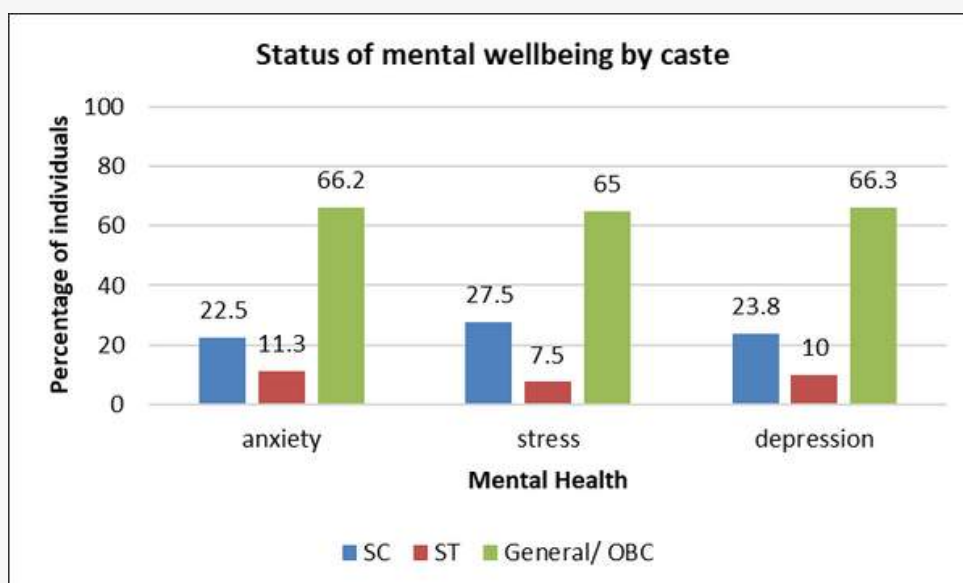


Figure 5.19b: Prevalence of anxiety, stress, and depression among the mothers/ caregivers (in percentage) according to the caste of the household

Figure 5.19b illustrates the distribution of mental health symptoms—anxiety, stress, and depression—among mothers or caregivers, disaggregated by the caste of the household: Scheduled Castes (SC), Scheduled Tribes (ST), and General/OBC categories.

Anxiety

- The General/OBC group shows the highest prevalence of anxiety at 66.2%. This is followed by SC households with 22.5%, and ST households with the lowest prevalence at 11.3%.

Stress

- Similarly, 65% of individuals in the General/OBC category reported stress symptoms.
- Among SC households, 27.5% of caregivers reported stress. Only 7.5% of those from ST households reported experiencing stress.

Depression

- Depression is most prevalent in the General/OBC group (66.3%), mirroring the trend observed in anxiety and stress. 23.8% of SC households reported depression, while only 10% of ST households did.

The figure reveals a striking trend where General/OBC households report significantly higher levels of anxiety (66.2%), stress (65%), and depression (66.3%) compared to SC and ST households. While SC households show moderate levels of these symptoms, ST households consistently report the lowest prevalence across all three categories. This variation may reflect differences in socioeconomic stressors, social expectations, awareness levels, or access to mental health services among caste groups.

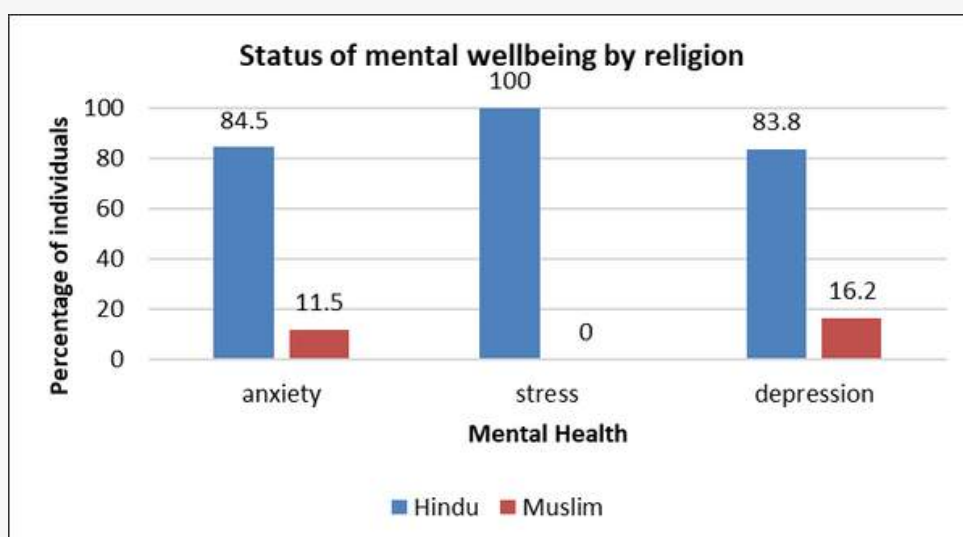


Figure 5.19c: Prevalence of anxiety, stress, and depression among the mothers/ caregivers (in percentage) according to the religion of the household

This figure illustrates the percentage of mothers or caregivers experiencing symptoms of anxiety, stress, and depression, disaggregated by the religion of the household – specifically Hindu and Muslim respondents.

Anxiety

- A significantly higher percentage of Hindu caregivers reported symptoms of anxiety (84.5%), compared to only 11.5% of Muslim caregivers.

Stress

- All reported cases of stress symptoms (100%) were found among Hindu caregivers.
- Muslim caregivers reported 0% stress symptoms in the sample.

Depression

- Similarly, 83.8% of Hindu caregivers experienced depressive symptoms.
- Only 16.2% of Muslim caregivers reported depression.

The data highlights a marked disparity in reported mental health symptoms between religious groups. Across all three dimensions—anxiety, stress, and depression— Hindu mothers/caregivers reported substantially higher prevalence compared to their Muslim counterparts. These findings may reflect a combination of factors including socio-demographic differences, exposure to stressors, reporting tendencies, or access to mental health awareness and services. Further qualitative investigation would be helpful to contextualize these differences.

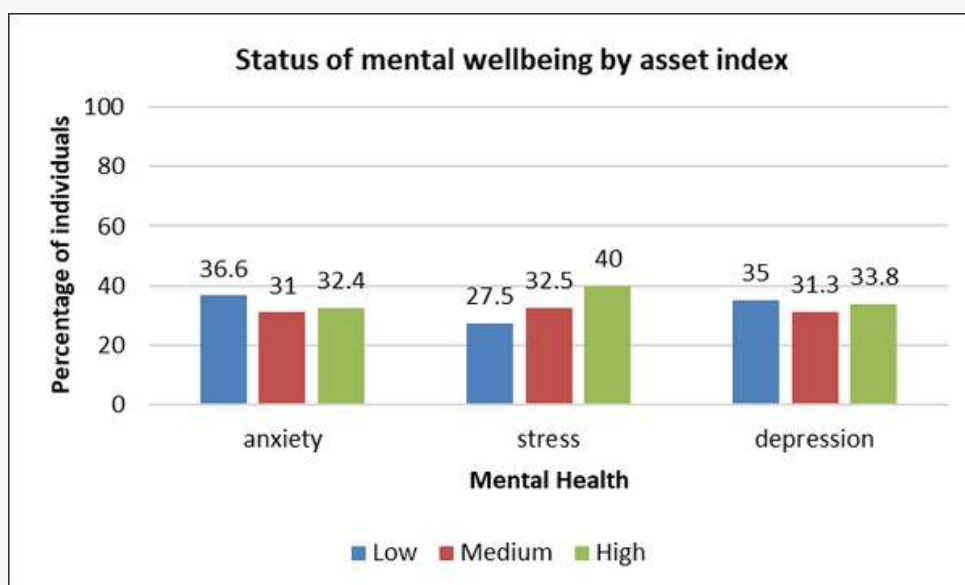


Figure 5.19d: Prevalence of anxiety, stress, and depression among the mothers/ caregivers (in percentage) according to the household asset index

Figure 5.19d presents the distribution of mental health symptoms—anxiety, stress, and depression—among mothers or caregivers, classified by household asset index levels: Low, Medium, and High.

Anxiety- Low asset households reported the highest prevalence of anxiety at 36.6%. This was followed by high asset households at 32.4%, and medium asset households at 31%.

Stress- Contrary to anxiety, stress prevalence was highest among high asset households (40%). Medium asset households reported 32.5%, while low asset households had the lowest stress levels at 27.5%.

Depression- Depression rates were comparable across asset groups:

- High asset households: 33.8%
- Low asset households: 35%
- Medium asset households: 31.3%

The relationship between asset ownership and mental wellbeing does not follow a clear linear pattern. While low asset households reported the highest anxiety, high asset households showed the highest stress prevalence. Depression levels were fairly consistent across all three asset categories, suggesting that asset index alone may not be a decisive factor in determining mental health outcomes. These findings point to the influence of other social, emotional, or contextual factors in shaping mental wellbeing among mothers and caregivers. These findings indicate a complex relationship between economic status and mental wellbeing, necessitating multi-dimensional intervention strategies that address both economic insecurity and non-material stressors affecting individuals in vulnerable island communities.

Along with the children, pregnant women are at high risk during and after extreme weather events, like- floods and cyclones due to their special conditions and suffer from health problems. Mothers reported that they experienced cyclones and floods while they were pregnant. One woman shared her experience when Yaas cyclone hit the Ghoramara Island in 2021—

I was standing on the road. The water is almost at the top. Snakes, various things are floating. Behind our house, there is a man's house who was engaged in pandal business, his bamboo was floating, and I was sitting on it. I haven't eaten anything all day. There was some rice in the house next door, they gave it to me. The next day I went to the Sagar Island.

During the focus group discussion, it is evident that all the mothers or caregivers who experienced cyclone events, everyone reported that they had to face problems during and after cyclone/ flood events. Increased physiological stress, psychological stress (fear), lack of access to health centers, interruption of prenatal care, lack of nutritious food, and lack of access to WASH facilities are some of the risk factors identified by pregnant women in disasters.

The indirect impacts of climate change on child and maternal health mediate through two pathways, i.e. through water insecurity caused by a disruption in freshwater services due to depletion of groundwater, increasing level of salinity in groundwater and surface water; and through food insecurity caused by the decrease in farm production, crop failure, the decline in fish production, etc. Similarly, ingress of saline river water during flood leads to salinization of the pond water. We also find that the households reported an increasing level of salinity even in the river water and it has an impact on the fish productivity.

Cyclones and floods are occurring at a persistently high frequency, with more than triple the number of annual occurrences in recent years. These extreme weather events may result in interruptions in the normal food supply coupled with inefficiencies in food systems, ultimately causing conditions of food insecurity in the studied areas. In the focus group discussion, the mothers told that—

We don't forget that particular date when the cyclone Yaas has hit in this island. We came to know that one cyclone would come, but we did not know about the floods. Water was spread over the throat within the blink of an eye. We could not do anything. It took us 30 days to start cooking food after the floodwater receded. We had only biscuits and muri for 3 days. However, we received food relief from various organizations for about 10-15 days.

Another woman shared—

You don't believe that condition. A child goes to someone's house and says can you give me some rice? What will we give them? There's nothing but bread and biscuits.

One of the AWW said that

ICDS centre was drowned. I couldn't open the door of the centre. Doors were blocked by the sacks of rice and pulses. Five sacks of rice were destroyed. I did not understand what I will do? Take care of my house or the centre?



Saltwater intrusion brings additional health risks for the women and children. Two study areas report that saltwater ingression during floods increases the incidence of fever and diarrheal problems among children and women. But, various organizations distribute litres of water among the households during that time. So, they didn't face any serious illness during the Yaas cyclone in 2021.

CHAPTER 6- CONCLUSION

This chapter focuses on the summarised findings of the nutritional status of the children aged two to six years and the utilization of ICDS in the Sagar and Ghoramara islands located in the Sundarbans region.

The pattern of food intakes, extent of recommended minimum dietary diversity among children and their mothers/caregivers, adherence to the recommended Infant and Young Child Feeding (IYCF) practices, sanitation and personal hygiene practices of household members, and psychological health of mothers/caregivers are also investigated.

Through face-to-face interviews with the sampled children and their mothers/caregivers, unstructured in-depth interviews with the members of local community were carried out to complete our understanding of the origin of the study islands, functioning of ICDS centres, vulnerability and morbidity of children and their mothers/caregivers due to adverse climatic events which occur almost every year. These understandings of child health, wellbeing and protection and their adaptation needs helped in making recommendations as part of the study. This chapter discusses the strategies to mainstream climate change adaptation needs in the existing plans and policy framework.



The western boundary of the Indian Sundarbans including Sagar and Ghoramara Islands are reported to be vulnerable. In spite of being an agriculturally dependent economy, yields have been negatively affected by coastal erosion, land loss and cyclonic surge causing saline water inundation, along with over-exploitation of resources. Paddy is the prime crop and consumable of the study islands and is considered as an indicator of the regional economy (Hajra et al., 2016).

The percentage of agricultural land is lowest in Ghoramara as this island has faced maximum land loss which includes a huge amount of agricultural land over time and experienced large consequential out-migration. Cultivators from this sinking island are forced to migrate and search for other livelihood options, due to which the agricultural practice became less and those lands remain as fallow land. Cultivation of betel vine was also one of the main sources of livelihood among the Islanders. But due to the cyclone particularly during Yaas cyclone with sea levels rising, the effects of coastal erosion and submergence have destroyed the betel vine, the primary livelihoods of residents. This not only made them poor, but also forced them to migrate keeping their small children at home with their grandparents. This non-practice and subsequent saline water inundation due to embankment failure further make these lands non-fertile.

Agricultural land loss as a consequence of erosion generates severe challenges to the farmer communities of these islands. There are strong associations between productivity loss with erosion and saline water inundation with consequential poverty, as poorest households experience that erosion and saline water inundation are responsible for maximum material losses including agricultural land and crop. High concentration of fertiliser has been used in the region mainly for betel leaf cultivation in order to boost production, compromising the sustainability of the system(Hajra et al., 2016).

Limited earning prompts the farmers to look for other livelihood options, particularly during non-monsoon months. This has compelled local cultivators to sell their lands and switch to other occupations such as daily labourers. During focus group discussion, we came to know from the mothers or caregivers that as a consequence of the Yaas cyclone, the production capacity of farming has reduced, What used to have to be cultivated once, now has to be cultivated twice, the cost has increased, the nutritional quality of vegetables has deteriorated. These are closely related to nutritional status of mothers and their children. While improving maternal nutrition could yield benefits for child health, a multidimensional intervention approach addressing hygiene, food security, and health services is essential for breaking the cycle of malnutrition in these vulnerable island communities.

The analysis of the findings from the field reveals that the nutritional status of children aged two to six years in the study areas highlights wasting and underweight are concerns in both regions, the chronic and acute indicators suggest that both the areas are nutritionally vulnerable, potentially due to more frequent exposure to climatic hazards, food insecurity, or limitations in health and nutrition services. These findings emphasize the need for targeted nutrition and health interventions to combat both short-term and chronic undernutrition among children.

The comparative analysis of child nutritional status between study areas and West Bengal reveals a mixed nutritional profile in the island communities relative to West Bengal. While stunting is somewhat less prevalent, both underweight and, especially, wasting are notably higher in Rudranagar and Ghoramara.

The disproportionately high level of wasting is a caution for acute food insecurity and health stress, necessitating urgent and sustained interventions. Programs targeting supplementary feeding, emergency nutrition, and resilient community-based health services are essential to mitigate the short-term shocks and ensure better nutritional outcomes for children in these vulnerable coastal regions.

This study also wants to understand how many of children between two and six years of age who received aid from an Anganwadi centre (AWC), ICDS or any other community health worker during preceding 12 months. *It is noted that the children used to take the mid-day meal from the ICDS and came back home. They do not eat the meal at the ICDS centre. So, there is a possibility of distribution of the mid-day meal among other family members. There are significant shortfalls in pre-school education and counselling services in both the study areas. These findings underscore the need to strengthen community health worker engagements, enhance ICDS program accountability, and expand early childhood care and nutritional education, especially in geographically and infrastructurally challenged areas like Rudranagar and Ghoramara.* Improving these service delivery mechanisms is crucial for ensuring the holistic development and well-being of children in these climate-vulnerable island communities.

This study reveals the number (and percentage) of children between the ages of two and six years who received micronutrient and preventive supplementation from community health workers. *The field data discloses a generally low coverage of micronutrient and preventive supplementation services across both study areas in all three categories—Vitamin A, deworming, and iron supplementation. The findings point to systemic gaps in the last-mile delivery of public health interventions. These could be due to irregular visits by health workers, stock shortages, lack of awareness among caregivers, or geographical inaccessibility.* There is a pressing need to strengthen the monitoring of supplementation schedules, improve community health worker outreach, and ensure adequate supply and awareness to achieve comprehensive nutritional and health support for children in these climate-vulnerable island communities.

The 24-hour dietary recall highlights that low levels of supplement consumption and the absence of fortified food use in both areas underscore gaps in micronutrient security and public health follow-up. *Overall, the data reveals critical deficiencies in food diversity, and stresses the need for nutrition-sensitive interventions, including improved food access through public distribution and ICDS programs, enhanced community awareness, and regular monitoring of child nutrition by local health workers. These measures are essential to address the hidden hunger and under-nutrition that continue to affect children in these vulnerable island communities.* However, the moderate coverage and high non-receipt in both areas suggest the need for greater emphasis on iron supplementation, especially in light of widespread anaemia prevalence in similar populations.

If we consider the percentage of children who had eaten/drunk the mentioned food items at least twice or more times during 24 hours preceding the survey, the frequency analysis highlights that the complete absence of frequent pulse/nut consumption in both areas is especially concerning and calls for targeted nutrition education and food supplementation programs.

These findings underline the need for diversification of diets through improved availability and affordability of nutritious foods, strengthening nutrition-sensitive agriculture and food programs, and enhanced public health communication to promote frequent consumption of key food groups. Such analysis is crucial for tailoring nutrition interventions in climate-stressed and geographically isolated communities like Rudranagar and Ghoramara.

When we try to understand the mean dietary scores (MDS) (out of eight food-groups) and percentage satisfying recommended minimum dietary diversity (MDD) (at least four food-groups) according to the norm of Infant and Young Child Feeding Practices (IYCF) during 24 hours preceding the survey, *it is found that while neither region meets the optimal dietary diversity standards that requires urgent policy attention and sustained community-based nutrition programs to improve child health outcomes.*

These findings reinforce the need to embed context-specific nutrition strategies within broader development initiatives in island regions like Rudranagar and Ghoramara, especially in the light of their geographical and environmental vulnerabilities. We also try to understand the prevalence of symptoms of common childhood illnesses (as reported by the mothers/caregivers) during 15 days preceding the survey.

This comparative analysis of childhood morbidity of two studied areas Rudranagar and Ghoramara, suggests a greater burden of infectious and acute illnesses likely influenced by environmental and socio-nutritional factors. It emphasizes the urgent need for: strengthening community health outreach, ensuring availability of clean water and sanitation, boosting immunisation and nutrition services and conducting regular screenings for chronic or less visible conditions such as developmental delays and mental health issues, especially in Rudranagar. Integrating these health measures with existing ICDS and Anganwadi programs can substantially improve child health outcomes in both regions.

The findings of treatment-seeking behaviour and out of pocket expenditure (OOPE in rupees) of the reported common childhood illnesses reflects call for expanded access to free or subsidised healthcare, especially for chronic or developmental conditions. Improved water, sanitation, and hygiene (WASH) services reduce diarrhoeal and respiratory illnesses. Integrated child health programs should go beyond treating acute symptoms and include screening, referral, and support for complex health issues.

The field data regarding the prevalence of underweight, stunting, and wasting (in per cent) according to mother's/caregiver's and household background characteristics highlights that gender, caste, maternal education, religion, and household economic status significantly influence child nutritional outcomes in the studied areas. While some inconsistencies may arise due to small sample sizes in specific sub-groups, overall patterns point to heightened vulnerability among girls, children of less educated mothers, Scheduled Tribes, Hindu households, and low-asset holding families, which often shows more extreme values. These insights call for targeted, community-specific nutrition and welfare interventions to mitigate child under-nutrition in these climate-vulnerable island regions.

The comparative analysis regarding the status of maintaining personal hygiene by children and other household members (in per cent) reveals the low numbers across most indicators underscore the urgent need for community-based hygiene education and access to basic sanitation materials in both locations. Addressing these gaps is critical for improving health outcomes, particularly among vulnerable groups such as children.

When we try to understand the mean dietary scores (MDS) (out of six food-groups) and percentage satisfying recommended minimum dietary diversity (MDD) (at least four food-groups) according to the norm during seven days preceding the survey among mothers/caregivers, it is understood that the overall low mean dietary scores and low MDD attainment highlight poor dietary diversity among mothers and caregivers in both Rudranagar and Ghoramara. This is concerning from a public health perspective, as inadequate dietary diversity is often linked to micronutrient deficiencies, poor maternal health, and negative child health outcomes.

The fact that less than one-fifth of the total sample met the recommended dietary diversity norm underscores the need for targeted nutritional interventions. Strategies may include nutrition education focused on low-cost, diverse diets, improved access to nutrient-rich food items such as pulses, dairy, fruits, and eggs and community-based awareness programs to promote minimum dietary diversity.

While both islands reflect suboptimal dietary diversity, the findings point to the urgent necessity of addressing food insecurity, awareness gaps, and systemic barriers to dietary quality in both locations to enhance maternal and child health outcomes.

Efforts must focus on improving access to diverse, nutritious food, scaling up supplementation programs, and ensuring regular healthcare services for early detection and management of malnutrition. Promoting awareness around balanced diets and appropriate feeding practices is equally critical. In these ecologically fragile and economically vulnerable island settings, addressing undernutrition and its emerging risks is essential for improving the overall health outcomes of children and their caregivers.

When we try to find out the relationship between the nutritional status of mothers/caregivers and that of their children in the two study areas, the data reveals that education level is the most consistent factor associated with underweight status among mothers, with lower educational attainment strongly correlating with higher under-nutrition. While caste and religion play roles that vary across locations, economic status alone does not predict nutritional outcomes reliably.

The analysis of mothers' and caregivers' background characteristics reveals a high prevalence of anxiety, stress, and depression in the study areas, particularly among those with lower educational attainment and those belonging to socially and economically marginalized groups. These mental health challenges are not isolated—they have a direct and profound impact on the well-being of children, especially in the critical 0–6 years developmental window. Maternal mental health is closely tied to a child's emotional security, cognitive development and nutritional outcomes.

The findings point to an urgent need for accessible and culturally responsive mental health interventions, including community-based counselling, psycho-social support, and awareness programs. Disparities linked to caste, religion, and geography further highlight the need for tailored, inclusive approaches that recognize the unique vulnerabilities of different groups.

This is where the Muskaan-Early Childhood Care Centres (ECCCs) can make a meaningful difference. By creating safe, nurturing spaces for both children and caregivers, Muskaan offers a structured environment that reduces stress and builds positive emotional bonds. Through regular parental workshops, psychosocial activities and frontline support, the centres will act as early intervention hubs—helping caregivers manage stress, connect with health workers and learn constructive ways to support their children's growth.

Moreover, Muskaan's integrated focus on child development, maternal well-being and community participation ensures that maternal mental health is not treated in isolation, but as a central pillar of holistic child care. These efforts are particularly crucial in the Sundarbans, where environmental risks, displacement, and poverty compound psychological distress. Strengthening such localized and inclusive models is key to breaking the intergenerational cycle of trauma and ensuring every child grows up in a stable, emotionally supportive environment.



The combined prevalence of wasting in Rudranagar and Ghoramara was 39%, which is alarmingly higher than the state average of 20%. This nearly twofold increase points to a significant short-term nutritional crisis in the island areas, likely driven by recurrent climatic hazards, disrupted food supply chains, inadequate sanitation, and poor dietary diversity. High levels of wasting indicate recent and severe weight loss, suggesting that children in these regions are at elevated risk of morbidity and mortality.

The study provides valuable baseline insights that can guide the planning and implementation of Early Childhood Care Centres (ECCC) in the region. Future assessments with larger sample sizes and longitudinal components are recommended to build on these findings and monitor changes over time.

The early childhood crisis in the Ghoramara and Sagar Islands in Sundarbans is a multi-dimensional challenge that stems from severe malnutrition, inadequate healthcare, poor early learning opportunities, psychosocial distress and climate-induced vulnerabilities. Despite government interventions like ICDS, POSHAN Abhiyaan and the Mid-Day Meal Scheme, systemic gaps in implementation, accessibility and quality of services continue to leave thousands of children in this fragile ecosystem at risk.

The high rates of chronic malnutrition, poor immunization coverage and early educational exclusion indicate that existing government efforts alone are insufficient. The absence of structured, climate-resilient Early Childhood Care Centres (ECCC) further compounds these issues, denying children their fundamental right to a safe, healthy, and stimulating early environment. *Investing in Early Childhood Care Centres in the Sundarbans is not just an intervention—it is an urgent necessity to bridge the existing service delivery gaps. By providing nutritional support, early education and psychosocial care, these centres can significantly improve child well-being and development outcomes.*



CHAPTER 7- RECOMMENDATIONS

The baseline findings on maternal and child nutrition, psychosocial health and service access in Ghoramara and Sagar Islands underscore the urgent need for targeted, community-anchored interventions. The Muskaan Early Childhood Care Centres (ECCCs), supported by SBI Foundation, are strategically positioned to respond to these gaps through a multi-sectoral, climate-sensitive model. Below are evidence-driven recommendations to inform and strengthen Muskaan's implementation:

Addressing Child Undernutrition through Nutritious Mid-Day Meals

The dietary assessments reveal inadequate intake of protein, milk, pulses, eggs and vitamin rich foods among children. While a majority receive food from Anganwadi Centres (AWCs), the nutritional quality is low, with repetitive meals like khichri being the norm and often consumed at home due to poor infrastructure.

- Muskaan ECCCs should offer daily hot mid-day meals prepared on-site or distributed hygienically, including a diverse menu rich in local, affordable sources of protein (e.g., eggs, pulses, fish), micronutrients (e.g., orange/yellow fruits, green leafy vegetables) and milk.
- Meals must be tailored to identified gaps and served in a child-friendly setting within the ECCCs to promote regular and supervised eating habits.
- Community kitchens or partnerships with local SHGs can also be explored for sustainable meal preparation.



Empowering Mothers and Caregivers through Nutrition Education

Mothers' dietary diversity is limited, with high rates of occasional or no intake of dairy, fruit, and protein-rich foods, compounded by socio-economic vulnerability and low awareness.

- Muskaan should integrate practical nutrition education sessions for parents into its monthly workshops, focusing on context-specific, low-cost dietary practices, including use of locally available foods (e.g., moringa, sweet potato, papaya, pulses).
- Caregivers must be sensitized to responsive feeding practices, optimal maternal nutrition and appropriate complementary feeding for infants through visual tools, demonstrations and food models.

Linking Health and Nutrition: Screening, Deworming & Supplementation

The baseline showed that over 60% of children lacked deworming or vitamin A supplementation, and many caregivers were unaware of iron supplementation.

- Muskaan ECCCs must conduct quarterly health check-ups, including growth monitoring, MUAC screening and anemia detection, facilitated by local health workers and visiting pediatricians.
- Routine deworming drives and micronutrient supplementation should be ensured in collaboration with ICDS and local health providers.
- ECCCs must build strong referral linkages with nearby health facilities and ANMs for continued care and follow-up.

Promoting Psychosocial Well-being through Play and Mental Health Support

The baseline reflects high maternal stress and anxiety, which can directly affect a child's early brain development and emotional health. Food insecurity, displacement, and limited family support compound these challenges.

- Muskaan must strengthen structured psychosocial activities (e.g., art therapy, mirror play, emotional charades, sensory play) to support emotional resilience in young children.
- Introduce mental health support for mothers/caregivers, including group counselling sessions, guided conversations, and safe space sharing during monthly workshops.
- Build awareness of the link between maternal mental health and early childhood outcomes, using IEC tools and storytelling methods during parental workshops.

Fostering Safe WASH Habits and Environment

Access to safe potable water is reasonably low, the quality of sanitation and drainage remains poor and hygiene behaviors were inconsistent.

- Organize monthly WASH workshops with caregivers and children using interactive tools like the games, handwashing songs and hygiene charts.
- Install child-friendly WASH corners in both centres to normalize clean habits (e.g., handwashing before meals, proper toilet use).
- Conduct awareness drives at the village level to promote community-wide behavior change.

Investing in Capacity-Building and Community Ownership

The success of Muskaan hinges on the active participation of local actors and parents. The project must also address climate vulnerability, caste marginalization, and low asset ownership, all of which shape child development outcomes.

- Train Community Mobilizers and ECCC facilitators on early childhood pedagogy, nutrition counselling and trauma-informed care.
- Strengthen Community Advisory Committees (CACs) with non-political local stakeholders like teachers, social workers, and ASHA & AWWs to ensure ongoing local oversight.

Strengthening School Readiness through FLN and Play-Based Learning

The baseline data from Ghoramara and Sagar Islands reveals critical gaps in early learning exposure and school readiness, especially for children aged 3–6 years. The existing ICDS centres, while offering basic nutrition, lack the pedagogical depth, learning materials and child-centric approaches needed to prepare children for formal schooling.

The Muskaan Early Childhood Care Centres (ECCCs) present a unique opportunity to address these gaps through a structured, child-friendly and context-adapted school readiness program focused on Foundational Literacy and Numeracy (FLN) and play-based learning.

Bridging the Learning Deficit through Structured FLN Curriculum

The ICDS curriculum implementation is often weak due to a lack of trained personnel, materials, and pedagogical planning. Children enter primary schools without basic language or numeracy skills, affecting their long-term academic progress.

- Introduce a structured FLN framework aligned with NCERT's NIPUN Bharat Mission at Muskaan ECCCs for children aged 3–6, focusing on pre-reading, pre-writing, early math and cognitive skills.
- Develop weekly thematic lesson plans integrating local stories, rhymes, objects and settings to make learning relatable, engaging and culturally grounded.
- Train facilitators on activity-based teaching methods and learning assessment tools to track child progress quarterly.

Play-Based Pedagogy to Foster Holistic Development

The baseline findings suggest that existing pre-school spaces offer limited stimulation and often emphasize rote learning. However, early childhood is best nurtured through experiential, play-led learning which supports physical, emotional, social, and cognitive growth.

- Implement a play-based curriculum T Muskaan ECCS that uses free play, group play, outdoor activities, story sessions and pretend play to develop motor skills, self-regulation, creativity and language.
- Set up activity corners (language, numbers, art, nature) in each ECCC with rotating learning materials and toys to keep engagement high.
- Celebrate learning milestones through “Learning Festivals” and “Parent-Child Activity Days” to encourage caregiver participation.

Parental Engagement in Early Learning

Findings show that caregivers often lack the understanding or resources to support children's learning at home, particularly in low-literacy households.

- Conduct parental workshops on “Learning through Play at Home” using simple, low-cost activities (e.g., counting vegetables, naming colors, storytelling).
- Distribute take-home learning materials, activity calendars and “play-at-home” kits to promote daily learning routines in the household.
- Build a culture of positive reinforcement where parents recognize small learning milestones and feel empowered in their child's education.

Conclusion

The findings from this baseline assessment highlight that the challenges surrounding early childhood development in the ecologically fragile islands of Ghoramara and Sagar are deeply multi-dimensional and interconnected. Issues of malnutrition, limited healthcare access, inadequate early learning exposure, poor sanitation, and rising maternal mental health concerns do not exist in isolation. Instead, they intersect and are further exacerbated by the region's extreme climate vulnerabilities—including recurring cyclones, saline water intrusion, and displacement. These adversities have compounded the hardships faced by children aged 0–6 and their caregivers, making it evident that piecemeal solutions are insufficient.

In light of these realities, any intervention aimed at improving early childhood outcomes in the Sundarbans must be holistic, integrated, and community-led. Children in these communities require nutritional security, timely immunizations, psychosocial support, accessible pre-primary education, and nurturing caregiving environments to not only survive but thrive. Equally crucial is the engagement of parents, caregivers, and local community actors, whose participation and ownership are indispensable to the long-term sustainability of any intervention.

This approach is closely aligned with India's progressive policy framework including the National Education Policy (NEP) 2020, POSHAN Abhiyaan, Saksham Anganwadi & POSHAN 2.0, and the National ECCE Curriculum Framework, all of which emphasize the importance of the first six years of life as foundational for long-term growth and learning. It also contributes meaningfully to global goals such as zero hunger, good health and well-being, quality education, gender equality, and climate action—key pillars of the Sustainable Development Goals (SDGs).

The Muskaan Early Childhood Care Centre (ECCC) model, supported by the SBI Foundation and implemented by SEED, is well positioned to operationalize this integrated vision. By weaving together nutrition, health, hygiene, education, mental wellbeing, and parental empowerment, Muskaan can act as a beacon of resilience and care in a region often left behind by conventional service delivery systems.

Investing in early childhood in climate-sensitive regions like Ghoramara and Sagar is not merely a developmental priority—it is a moral imperative. With the right mix of community participation, institutional support and sustained funding, we can ensure that children here are not only protected from adversity but are also equipped with the tools to lead healthy, dignified, and fulfilling lives.

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