SMART

NUTRITION SURVEY

DISTRICT Jacobabad

Sindh Province, Pakistan

September, 2023

unicef for every child

HIMAT CONSULTING Private Limited

ACTION AGAINST HUNGER

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1. List of Acronyms

AAH	Action Against Hunger Canada
ACF	Action Contre la Faim
ANC	Antenatal Care
CMAM	Community Management of Acute Malnutrition
CDR	Crude Death Rate
CI	Confidence Interval
DEO	Data Entry Operator
EBF	Exclusive Breastfeeding
EPI	Expanded Program on Immunization
GAM	Global Acute Malnutrition
IYCF	Infant and Young Child Feeding
IPC	Infection Prevention and Control
MAD	Minimally Acceptable Diet
MAM	Moderate Acute Malnutrition
MDD	Minimum Dietary Diversity
MIYCF	Maternal & Infant Young Child Feeding
MUAC	Mid-Upper Arm Circumference
NNS	National Nutrition Survey
NGO	Non-Governmental Organization
PLW	Pregnant and Lactating Women
PPS	Probability Proportion to Size
SAM	Severe Acute Malnutrition
SMART	Standardized Monitoring and Assessment of Relief and Transitions
U5DR	Under 5 Death Rate
UNICEF	United Nations Children's Fund
WASH	Water, Sanitation, and Hygiene
WHZ	Weight-for-Height Z-score

2. Executive Summary

The SMART Nutrition Survey of Jacobabad was conducted in collaboration with UNICEF with the support of Himat Consulting, under the technical supervision of Actions Against Hunger Canada. The survey aimed to address the lack of nutritional data available for children under five years and Pregnant and Lactating Women (PLWs) in District Jacobabad. The survey findings will be used to scale up interventions, design new programs, identify gaps, and advocate for changes in health and nutrition policy.

The objectives of the SMART survey included measuring the prevalence of wasting and stunting in children aged 6-59 months, assessing the Maternal & Infant Young Child Feeding (MIYCF) practices for children aged 0-23 months, determining the coverage of nutrition services for children under five and PLWs, evaluating food security and livelihood situation, assessing household food consumption, determining the urgency of the situation, and comparing data with previous surveys. Additionally, the survey aimed to determine mortality rates, coverage of child health services, the prevalence of diarrhea among children, coverage of antenatal care and iron-folic acid supplementation, access to safe water supply and sanitation facilities, and availability and use of hygiene facilities.

The survey covered both rural and urban populations in the Jacobabad district, with a two-stage cluster sampling technique applied for sampling and data collection. The sample size was calculated based on parameters related to malnutrition and mortality rates, taking into account the prevalence of Global Acute Malnutrition (GAM) and estimated death rates. The sampling procedure involved the selection of clusters and households using probability proportion to size and systematic random sampling techniques. The division of clusters into smaller segments was done to facilitate the line listing process and ensure timely completion of the survey. In total, 62 clusters were selected for the survey.

Overall, the SMART Nutrition Survey of Jacobabad aimed to provide comprehensive data on the nutrition and health status of children under five years and PLWs, as well as related factors such as food security, access to healthcare services, and sanitation facilities. The findings will inform targeted interventions and policy changes to improve the nutritional well-being of the population in district Jacobabad.

Key findings of Nutritional status of Children and mothers

The SMART Nutrition Survey conducted in Jacobabad, District Jacobabad in 2023 provides valuable insights into the anthropometry and nutritional status of children, as well as the demographic profile of households in the district. A total of 485 households were successfully surveyed, representing approximately 100% of the households visited. In terms of anthropometry, a total of 586 children (309 boys, 277 girls) were assessed for their nutritional status, Z-score for 09 children shows out of range therefore, result is based on 595 children. The prevalence of **Wasting amongst children under 5 years of age-Global Acute Malnutrition (GAM)** based on

the Weight for Height (W/H) Z-score **was found to be 24.2%;** 25.9% in males and 22.4% in females, indicating a high level of malnutrition based on WHO standards[1].

A total of **16.1% Pregnant and Lactating Women (PLW)** were found to be acutely malnourished in the district which is a determinant of birth outcomes and infant/child nutritional status. Amongst the causal factors the most alarming was the **Minimum Dietary Diversity-Women (MDD-W) where 87.3%** of the PLWs scored medium to low scores on the said indicator and only 12.3% scored high. The responses on the **Food Insecurity Experience Scale (FIES)** also depicts the causal routes where **84%** of the respondents experienced moderate and severe hunger.

The key indicator of **Minimum Dietary Diversity for 6–23 months (MDD)** shows that only **6.3%** of the target have access to the standard recommended food groups.

Key findings against the selective indicators for demographic and nutrition status of children of 6-59 months are summarized in the table below:

Table 1: Summary Findings of District Jacobabad

Indicator	Finding
Demographic	
Total Population (Mid-Interval)	3143
Total No. of HHs Assessed	485
% of under five children	20.9%
Average Number of Persons per Household	6.5
Nutrition Status of Children 6 – 59 Months	
Global Acute Malnutrition (WHZ) (<-2 z-score and/or oedema)	**24.2 % (20.2 – 28.7 95% CI)**
Male	25.9 % (20.7 – 31.8 95% CI)
Female	22.4 % (17.1 – 28.8 95% CI)
Severe Acute Malnutrition (SAM) WHZ (<-3 z-score and/or oedema)	**7.2 % (5.1 – 9.9 95% CI)**
Male	8.4 % (5.8 – 12.0 95% CI)
Female	5.8 % (3.2 – 10.2 95% CI)
Moderate Acute Malnutrition (MAM) WHZ (<-2 z-score and >=-3 z-score, no oedema)	**17.1 %** (14.1-20.6 95% CI)
Male	17.5 **%** (13.5 – 22.3 95% CI)
Female	16.6% (12.4 – 21.9 95% CI
Oedema	0.0%
GAM [MUAC] (< 125 mm and/or oedema)	**16.6 %** (13.1 – 20.9 95% C.I.)

[1] WHO Classification of wasting: <2.5%: very low, 2.5 to <5%: low, 5 to <10%: medium, 10 to <15%: high, ≥15%: very high

Indicator	Finding
SAM [MUAC] (< 115 mm and/or oedema)	**5.5 %** (4.0– 7.7 95% C.I.)
MAM [MUAC] (< 125 mm and >= 115 mm, no oedema)	**11.1 %** (8.5 – 14.3 95% C.I.)
Prevalence of combined GAM (WHZ <-2 and/or MUAC < 125 mm and/or oedema)	**28.7 %** (24.2 – 33.8 95% C.I.)
Prevalence of combined SAM (WHZ < -3 and/or MUAC < 115 mm and/or oedema	**10.3 %** (7.8 – 13.3 95% C.I.)
Stunting [HAZ] Prevalence of stunting(<-2 z-score)	**47.7 %** (38.5 – 49.9 95% C.I.)
Prevalence of severe stunting (<-3 z-score)	**20.0 %** (16.3 - 24.5 95% C.I.)
Underweight [WAZ] Prevalence of underweight (<-2 z-score)	**33.9 %** (28.4 – 39.9 95% C.I.)

Assessment of Jacobabad population through SMART Nutrition Survey revealed high rates of malnutrition among children aged 6 to 59 months, with 24.2% affected by Global Acute Malnutrition (GAM) and 7.2% by Severe Acute Malnutrition (SAM). Stunting affected 47.7% of children, and 33.9% were underweight. GAM by MUAC 16.6% (CI 13.1 – 20.9) and SAM by MUAC was 5.5% (CI 4.0- 7.7)[2].

It is worth mentioning the considerable difference between GAM prevalence identified through WHZ (24.2%) as opposed to 16.6% based on MUAC measurements. This implies a significant impact on the actual number of prevailing cases in the community which is 24.2% Vs the admission criteria of CMAM programmes which considers MUAC only. This indicates a need for a national policy dialogue to contextualize the admission criteria for CMAM programmes as having MUAC criteria alone will result into a huge number missed cases that are actually malnourished but not detected by the MUAC parameter. The national technical committee for nutrition should discuss the dynamics of body shapes specific to Pakistan and contextualize the recommendations for future programs. However, there is a need to strike balance between the disease burden and resources available as expanding the admission criteria to WHZ will significantly increase the caseload for CMAM programs.

The prevalence of **underweight**[3] among children aged 6-59 months was 33.9%, with severe underweight affecting 16.5% of the children. Both boys and girls were nearly equally at risk of malnutrition (p-value 0.365).

Stunting, an indicator of chronic malnutrition, was found in 47.7% of the surveyed children. Boys had a slightly higher prevalence of stunting compared to girls, although the difference was not statistically significant (p-value. 0.295).

[2] WHO/UNICEF classification of wasting: <2.5%: very low, 2.5 to <5%: low, 5 to <10%: medium, 10 to <15%: high, ≥15%: very high

[3]WHO Classification of Underweight: Low - <10%, Medium – 10-19.9%, High -20-29.9%, Alarming/Critical -> 30%

The severity of malnutrition among children aged 6-59 months was classified as "Very High" for wasting, critical for underweight, and very high for stunting[4].

Comparing the results of the NNS 2018 with SMART survey 2023, it shows an improvement in the acute malnutrition rates but a slight increase in the stunting rates. The improvement might be attributed to the CMAM services being provided over the past 5-6 years in the district however the longer-term deprivation and the underlying causes of malnutrition still prevail in the communities which needs sustained nutrition specific interventions within the health system while context specific nutrition sensitive interventions to prevent the causal routes.

Table 2 Comparative data of NNS and SMART Survey

Indicators	NNS 2017-18	SMART 2023
Global Acute Malnutrition	30.5%	24.2%
Underweight	40.5%	33.9%
Stunting	45.8%	47.7%

Retrospective Mortality

The provided information includes data on retrospective mortality rates and causes of death within a given population. The Crude Death Rate (CDR), which represents the total number of deaths per 10,000 people, is reported at 0.44% with a confidence interval ranging from (0.23 -0.86).

The Under 5 death rate (U5DR), focusing specifically on deaths of children under the age of five, data provides further details on mortality rates, and was 0.44 in Jacobabad. The CDR was broken down by sex and age groups. For males, the CDR was reported at 0.44% with a confidence interval of 0.23-0.86; Females have a slightly lower CDR of 0.26%, with a confidence interval of 0.10-0.68. Design effect implies that male ratio is higher in sex specific mortalities in district Jacobabad compared to females. . Data shows that 100% of the deaths that occurred in current location were caused by illness. Overall, the mortality rates, including the Crude Death Rate and Under 5 death rate, are below the established public health emergency thresholds[5], suggesting that the population's mortality and child mortality rates are not of significant concern from a public health standpoint.

Recommendations

The high prevalence of malnutrition, particularly Global Acute Malnutrition (GAM) and Severe Acute Malnutrition (SAM), among children aged 6 to 59 months in Jacobabad is alarming and requires immediate attention.

[4] WHO Classification of stunting: <2.5%: very low, 2.5 to <10%: low, 10 to <20%: medium, 20 to <30%: high, ≥30%: very high

[5] South Asia CDR baseline 0.22, CDR Emergency threshold 00.40), U5DR baseline 0.46, U5DR Emergency threshold (0.90)

To address this issue, a comprehensive and multi-faceted approach is recommended. These high rates of malnutrition call for a sustained full package of nutrition program built within the health system pillars as including into the primary health care package. First and foremost, there is a need for an emergency nutrition intervention and extension of the current programs, including the provision of ready-to-use therapeutic foods (RUTF) for the treatment of severe cases, as well as ready to use supplementary foods (RUSF) for the supplementary feeding programs of moderately malnourished cases.

In addressing the elevated mortality risks, it is imperative to strengthen the overall healthcare system in Jacobabad. This can be achieved by investing in healthcare infrastructure, training healthcare workers, and improving access to essential medical services. Given the higher crude death rate (CDR) among males and the under 5 death rate (U5DR), gender-specific healthcare initiatives should be considered to bridge this gap. Efforts should focus on reducing maternal and child mortality through improved maternal and child health services, including antenatal and postnatal care. Collaboration between local health authorities, non-governmental organizations, and international agencies is vital to ensure a coordinated and effective response to both the malnutrition crisis and the high mortality risks in Jacobabad.

Addressing malnutrition efforts working has to be mainstreamed into food security, and WASH interventions to prevent the incident cases can help ensure access to diverse food for women and children as well as safe water and hygienic environment new cases of malnutrition. Additionally, community-based initiatives like family MUAC, mass awareness campaigns on proper nutrition practices, breastfeeding promotion, and hygiene should be implemented to address the root causes of malnutrition and prevent its recurrence.

Development of district level multi sectoral strategies and regular monitoring of the nutritional status of children, along with timely adjustments to intervention strategies, are crucial for sustained impact. Additionally, expansion of the social safety net Programmes to cover the food insecure population.

3. Introduction

3.1. Jacobabad – district at the glance

Jacobabad district is situated between 27° 55' to 28° 29' North latitudes and 68° 00' to 69° 44' East longitudes[6]. It shares its eastern border with Kashmore-Kandkot district (Sindh), to the north with Jaffarabad district (Baluchistan) and Dera Ghazi Khan district (Punjab), to the south with district Shikarpur (Sindh) and Larkana (Sindh), and to the west with district Shahdadot-Kamber (Sindh)[7].

[6] https://pwd.sindh.gov.pk/
[7] https://reliefweb.int/report/pakistan/pakistan-emergency-situational-analysis-district-jacobabad-july-2014.

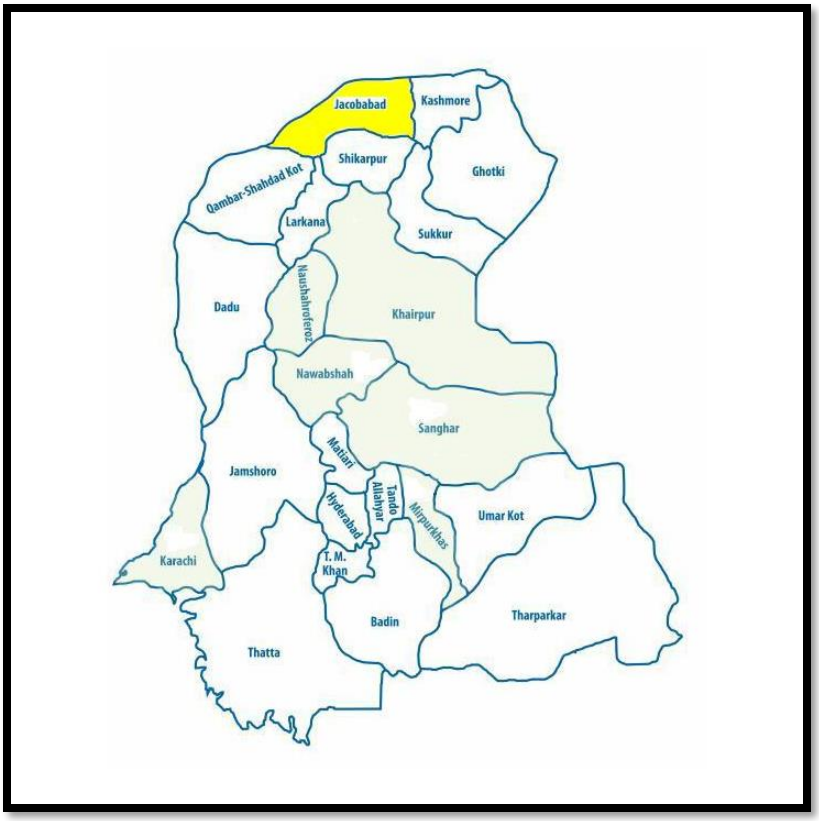

Figure 1: Maps of District Jacobabad[8]

3.2. Demography and Population

Jacobabad district had a population of 1,007,009, of which 297,218 (29.51%) lived in urban areas. Jacobabad had a sex ratio of 956 females per 1000 males and a literacy rate of 34.07%: 44.93% for males and 22.77% for females[9].

3.3. Economy & Livelihoods

The economy of Jacobabad is agriculture, livestock, breeding, fishing & hunting. This year's crops were first scorched by temperatures that reached 51 degrees Celsius (124 Fahrenheit) in May, only to be drenched by monsoon rains that affected a third of the country –- a scale never seen in Pakistan.

[9] Pakistan Bureau of Statistics. https://www.pbs.gov.pk/sites/default/files/population/2017/results/07501.pdf

3.4. Survey Justification

The national Nutrition survey NNS 2018 indicated (30.5%) Global Acute Malnutrition (GAM) prevalence of under 5-year children of district Jacobabad. There was a high risk of further deterioration of health and nutrition status, access and availability of nutrition services due to potential impact of food insecurity and malnutrition. However, nutritional data was unavailable for children under five years and Pregnant and lactating women (PLWs). The Department of Health, District Jacobabad, decided to conduct a SMART Nutrition Survey in collaboration with UNICEF and with the support of Himat Consulting under the technical supervision of Action Against Hunger (AAH) Canada.

The survey findings will be used to scale up the intervention, initiation of new program design, identification of gaps and advocate for any necessary changes in\ health and nutrition policy. During Survey Implementation necessary technical guidelines recommended by UNICEF, Nutrition Directorate and Action Against Hunger Technical Advisor were followed.

3.5. Survey Objectives

The purpose of the current assignment was to design and conduct a survey in the selected districts of Sindh, and contribute to the ongoing interventions on strengthening the nutrition information system, early warning as well as disaster risk reduction. A district-level SMART survey was an extension of the recently conducted NNS 2018, which provides first-ever district-level nutrition and food security data.

The objectives of the SMART surveys were following:

1) To measure the prevalence of wasting and stunting in children aged 6-59 months and wasting among pregnant and lactating women (PLW).
2) To assess the MIYCF practices for children aged 0-23 months
3) To determine the coverage of preventive and curative nutrition services for children under five years of age, and pregnant and lactating women (PLW)
4) To determine the food security and livelihood situation
5) To assess household food consumption (quantity and quality).
6) To assess the urgency of the situation and how it may evolve in the future by comparing data with previous surveys.

Health

1) To determine retrospective crude mortality rate (CMR) and under five mortality rates (U5MR).
2) To determine the coverage of child health services (Immunization/measles vaccination, vitamin A supplementation, common childhood illness and deworming.
3) Prevalence of diarrhea among children aged 6-59 months, and determine use of oral rehydration salt (ORS) and/or zinc during diarrhea episodes in children aged 6-59 months

4) To determine enrolment into antenatal care and coverage of iron-folic acid supplementation in pregnant women

WASH

5) To determine the population's access to, and use of safe water supply including distance to facility and quality of water
6) To determine the population's access to sanitation facilities including issues of safety and privacy of the facilities
7) To determine the population's access to hygiene facilities and availability and use of soap.

3.6. Survey Area

The study area of the Jacobabad district included both rural and urban population; 65.3% rural and 34.7% urban[10]. Village wise population data was collected from the Expanded Program on immunization EPI for cluster identification using ENA software (version 11th Jan 2020).

4. Methodology

4.1. Type of Survey

A population representative cross-sectional household survey following Standardized Monitoring and Assessment of Relief and Transitions (SMART) methodology was designed. Two stage cluster sampling technique was applied for sampling (identification of clusters/households) and data collection. During implementation of survey Infection Prevention and Control (IPC) measures were being followed.

4.2. Sample size calculation

The sample size was designed to achieve reasonable precision for estimating acute malnutrition as well as mortality separately. All calculations were made using ENA for SMART software (version Jan 11th 2020). The parameters and rationale considered for sample size calculations in two different contexts: anthropometry (related to malnutrition) and mortality rates.

For the anthropometric parameters, the prevalence of Global Acute Malnutrition (GAM) in Jacobabad is estimated at 30.5% (NNS-2018). The desired precision set at 5.5, and 1.5 design effect used to account for heterogeneity in nutritional status within district. The sample size for children aged 6-59 is calculated to be 440, and the average household size is determined to be 7. Additionally, the percentage of the population represented by children under 5 is 14.8%, and a non-response rate of 3% was anticipated.

For the mortality parameters, the estimated death rate was 0.30 deaths per 10,000 populations per day, and a design effect of 1.5 was applied based on SMART recommendations for cluster sampling. The recall period for mortality data collection was 101 days, with a memorable recall event considered to be the 1st June (Summer vacation). The average household size was 7. The anticipated non-response rate was 3%, resulting in a calculated number of individuals (2070) and households (305) to be included in the sample. These parameters and rationale were crucial for determining appropriate sample sizes and ensuring accurate representation and precision in the collected data. They provided a foundation for conducting studies and assessments related to anthropometry and mortality rates. (See Table 2 below):

Table 3: Parameters and rationale

Anthro / Mortality Parameters	Updated parameters	Rationale
Estimate Prevalence	30.5	Global Acute Malnutrition (GAM)-% (NNS 2017-18)
Desired Precision	5.5	As per SMART Manual Suggested
Design Effect	1.5	A design effect of 1.5 was used. This is based on the assumption that there is some level of heterogeneity in the nutritional status within the districts.
Sample Size (Children 6-59)	440	Calculated by ENA software

Average HH Size	7	Based on Census Data 2017
% of U5s	14.8	Population Census Pakistan-2017 district tables
% of NRR	3	Non-response
Household to be included	**486**	**Calculated by ENA software**
Estimate death rate	0.30	Taken from country level Mortality rate (6.736) 2023 and divided in 10,000/day
Desired Precision	0.3	+- desired precision per 10,000/day
Design Effect	1.5	As per SMART recommendation for Cluster Sampling
Recall Period in days	101	1st June (first day of summer vacations)
Average HH Size	7	Based on Census Data 2017
% of NRR	3	Anticipated non response rate
Population to be included	2070	Calculated by ENA software
Household to be included	305	Calculated by ENA software
Total Clusters	49	10 HHs per team per day

*Recall period has to be adjusted during analysis based on the actual survey data collection period and therefore, there might be slightly differ from the initial protocol assumed recall period.

4.3. Selection of Clusters and households

Two stage sampling procedure was applied to conduct the SMART survey. In the ***first stage***, a cluster or a primary sampling unit (PSU) was selected. A list of villages/clusters with updated population was used to select the sample of clusters by uploading the list in ENA (version Jan, 11 2020) software. In the ***second stage*** basic sampling unit (BSU) comprising of households present in the sampled cluster were mapped and line listed. The selection of households was then done through a systematic random sampling technique.

In some cases villages/clusters population was large in size or widely dispersed or scattered, making it difficult for the team to perform line listing and complete the target on time. In order to achieve the target and reduce burden of line listing, segmentation process was followed. In this process, village population was divided into smaller (min 50 and max 150HH) equal or unequal segments, based on existing structures (block, sub-blocks, mosque, temples, river, canals, & rail line) and one segment was randomly selected. The selection of segment to represent the cluster was done through application of Probability Proportion to Size (PPS) methodology based on the population size of the households. The clusters were distributed to allow each team to complete one cluster per day.

During the preliminary household listing and observatory visits, it was evident that not all mothers could partake in the survey throughout the day due to their work commitments. However, by scheduling survey team visits between 07:00 AM to 01:00 PM and again from 03:00 PM to 07:00 PM, it was observed that a majority of mothers could participate. To accommodate this, the data collection plan and office hours were adjusted, allowing for a longer break during lunch. It's important to note that stringent security procedures were implemented during the survey.

Each team calculated the number of households they could survey per cluster per day at various locations, considering travel time and the time required to select and survey households. They found that each team could feasibly visit and complete questionnaires for 10 households per day in each cluster.

Table 4 Calculation of HH coverage/day/team

Calculation of HH coverage/day/team		
Event/Activity	Time to dedicate	Total time remaining
Time per day for field work including lunch and refreshment/prayer break	7:00 -19:00=720 min	720 min
Travel time (including travel time, round trip)	60 min X 2 trip =120 min	720-120=600min
Lunch and prayer break	13:00-15:00= 120 min	600-120= 480 min
Average time allocated for households' interview by one interviewers (Interview + Travel time between household	45 min+ 5 min= 50 min	All indicators may not require to collect from all households except demo, food security and WASH. For instance, almost two third of slum's households have no child meaning that team need less time for these households. For the household having children, measurer assistant will move to the next households after completing measurement in previous HH.
Total number of HH's to be covered by each team per day (with one interviewers)	480 min/50 min per HH=9.6 households ≡ 10 Households	
Total number of HH's to be covered by each team per day (with two interviewers)	10 households*6 teams= 60 households	

An average of 60 households per day, 60 respondents was interviewed, totaling approximately 49 clusters. This goal of 485 households was achieved within the allotted 08-day timeframe. Clusters and backup clusters were allocated using ENA software. The reserve clusters (RC) would only be activated if more than 10% of the planned clusters couldn't be included for any reason.

4.4. Training of Field Data Collection Teams

The training was conducted in Jacobabad for 6 data collection teams, each consisting of a supervisor and two data collectors. The training content covered various modules, including household information, mothers/care-takers data, child nutrition and immunization status, and

child's current health. The implementation modalities and ethical considerations were also discussed.

The training was conducted over six days, and included theoretical and practical components. The training was delivered by a team of professionals, including SMART experts, and public health consultants.

Pre and post-tests were conducted to assess participants' knowledge gain, and a standardization test was performed to evaluate their anthropometric measurement skills. The results of the pre and post-tests showed a significant improvement in knowledge among participants. The Jacobabad team collectively obtained 201/315 (63.8%) marks in the pre-test, while in post-test they scored 240/315 (76.1%) marks, showing an overall improvement of 35%.The capacity enhancement of participants anthropometric measurement skills was also assessed through standardization tests on training day 4 and 6. Overall, the training program successfully built the capacity of the field teams to collect quality data. With the completion of the training and standardization exercises, the teams proceeded for data collection in the field.

4.5. List of indicators

Bilateral Pitting Oedema: was assessed by applying a moderate thumb pressure on BOTH feet for three seconds. If oedema is present, a shallow pit will remain after releasing pressure from the feet. Only children with bilateral oedema (oedema on both feet) are diagnosed positive for nutritional Oedema. Supervisor confirmed all cases of oedema. However, no oedema case found during the assessment h)

Crude mortality rate (CDR): One of the primary goals of humanitarian response to a humanitarian crisis is the prevention and reduction of mortality. The CDR is a metric frequently used to gauge the severity of a humanitarian crisis. It is defined as the number of deaths from all causes per 10,000 people per day over a specified period of time. It is calculated from the following formula:

CDR = Number of deaths / (mid-interval population / 10,000) x time interval = deaths / 10,000 / day

Under five death rate (U5DR): U5DR is defined as the number of deaths among children under five from all causes per 10,000 people per day over a specific period of time. It is calculated from the following formula:

U5DR = Number of under 5 deaths / (mid-interval population / 10,000) x time interval = under 5 deaths / 10,000 / day j) Diarrhea was assessed through two weeks recall period. Diarrhea is defined as passage of three or more loose or liquid stools in a day in children aged 6-59 months. k)

Use of ORS/zinc during a diarrhea episode: The interviewer was asked the mother/caregiver of the child if he/she received ORS sachets and/or zinc during a diarrhea episode. An ORS sachet and a zinc pill were shown when asked to recall.

Measles vaccination in children 9-59 months: Measles vaccination were assessed among children aged 9-59 months by checking for the measles vaccine on the EPI card if available or by asking the caregiver to recall if no EPI card is available.

Vitamin A Supplementation in children 6-59 months: Vitamin A supplementation was assessed among children aged 6-59 months by checking the EPI card if available or by asking the caregiver to recall if no EPI card is available.

Case definitions Infant and Young Child Feeding practices: Only few important IYCF indicators were used to calculate them are detailed below.

Exclusively breastfed for the first two days after birth: Percentage of children born in the last 23 months who were fed exclusively with breast milk for the first two days after birth Children born in the last 24 months who were fed exclusively with breast milk for the first two days after birth Children born in the last 24 months

Early Initiation of breastfeeding: Proportion of children born in the last 24 months who were breastfed within one hour of birth. Children born in the last 24 months who were put to the breast within one hour after birth Children born in the last 24 months

Exclusive breastfeeding under 6 months: Percentage of infants 0–5 months of age who were fed exclusively with breast milk during the previous day Infants 0-5 months of age who received only breast milk during the previous day Infants 0-5 months of age

Bottle feeding: Proportion of children 0–23 months of age who are fed with a bottle. Children 0–23 months of age who were fed with a bottle during the previous day Children 0–23 months of age

Minimum dietary diversity: Percentage of children 6–23 months of age who consumed foods and beverages from at least five out of eight defined food groups during the previous day. The eight food groups used for tabulation of this indicator are:

- Breast milk
- Grains, roots, tubers and plantains
- Pulses (beans, peas, lentils), nuts and seeds
- Dairy products (milk, infant formula, yogurt, cheese)
- Flesh foods (meat, fish, poultry, organ meats)
- Eggs
- Vitamin -A rich fruits and vegetables
- Other fruits and vegetables.

Minimum meal frequency: Proportion of breastfed and non-breastfed children 6–23 months of age who receive solid, semi-solid, or soft foods (but also including milk feeds for non-breastfed children) the minimum number of times or more.

- Minimum meal frequency for non-breastfed children [6-23 months] [>=4 full meals]
- Minimum meal frequency for breastfed children [6-8 months] [>=2 full meals]

• Minimum meal frequency for breastfed children [9-23 months] [>=3 full meals]

Minimum acceptable diet: Percentage of children 6–23 months of age who consumed a minimum acceptable diet during the previous day

4.6. Data analysis and review process

To ensure data accuracy and precision, the data collected from the field was consistently reviewed on daily basis and at multiple levels.

At the field level, anthropometry, mortality and data submitted in cluster control forms in hard form was reviewed by the monitors before data entry by the DEOs, for cleaning any logical errors. The plausibility analysis was then run by SMART Nutrition expert using ENA software and shared with AAH Regional Advisor for review and endorsement. The result of plausibility analysis was shared with AAH on daily basis before teams proceeded to the next clusters.

Feedback provided to the monitors for correction of errors identified through field verification after revisits. The process of data collection and data output was also reviewed several times during the field activities by joint monitoring team of UNCEF, AAH and Himmat for taking necessary actions to ensure data quality.

4.7. Standardization Test

Based on satisfactory performance of data collectors recruited in district Jacobabad for SMART Nutrition survey were taken onboard in district Jacobabad. Training on anthropometric techniques and basic concepts of SMART survey were delivered by SMART experts.

4.8. Monitoring and Supportive Supervision

UNICEF monitoring team, ensured the quality of data collection processes with support of UNICEF, AAH and Himat through close and continued monitoring and supportive supervision. Stakeholders discussed observations made during the monitoring visits and provided feedback to the teams to further improve data collection process. Following are glimpses of training and field activities relating to SMART Nutrition Survey in Jacobabad district.

5. Survey Findings

5.1. Household Characteristics and Demographic Profile

SMART Nutrition Survey in Jacobabad covered a total of 486 households. One household refused to participate in survey and 485 households were successfully surveyed, which accounts for approximately 99.7% of the total households visited.

Table 5: Overall achievement of Sample Size District Jacobabad

Overall achievement of sample size					
Achievement			**# of Children recorded**		
Achieved Sample of Clusters	Achieved sample of HH	Achieved Sample of children	0-59 Months children	6-59 Months children	0-23 Months children (IYCF)
100%	99.7%	135.4%	639	596	250

5.2. Nutritional status of children 6-59 months

The overall plausibility score of district Jacobabad was 7% which positively implies the quality of the survey under excellent category. Children were weighed removing of all clothes to the nearest 100g (0.1 kg) by using a SECA electronic scale. The children who can easily stand are asked to stand on the weighing scale and their weight is recorded. In a situation when the children cannot stand, the double weighing method is applied. The prevalence of Global Acute Malnutrition (GAM) in District Jacobabad based on weight for height z-score/and or oedema was 24.2 % (20.2 - 28.7 95% C.I.) and the prevalence of Severe Acute Malnutrition (SAM) was 7.2% (5.1 – 9.9 95% C.I.). The overall GAM[11] prevalence is indicative of high malnutrition based on the WHO standards. Analysis of gender shows no significant difference of malnutrition among both groups (p-value: <0.548), both are at equal risk of malnutrition with the prevalence of 25.9% (20.7 – 31.8 95% C.I.), and 22.4% (17.1 – 28.8 95% C.I.) respectively.

Table 6: Prevalence of acute malnutrition based on (Wasting) weight-for-height z-scores (and/or oedema) and by Boys vs Girls

	All n = 586	Boys n = 309	Girls n = 277	P value
Prevalence of global malnutrition **(<-2 z-score and/or oedema)**	(142) 24.2 % (20.2 - 28.7 95% C.I.)	(80) 25.9 % (20.7 - 31.8 95% C.I.)	(62) 22.4 % (17.1 - 28.8 95% C.I.)	0.548
Prevalence of moderate malnutrition **(<-2 z-score and >=-3 z-score, no oedema)**	(100) 17.1 % (14.1 - 20.6 95% C.I.)	(54) 17.5 % (13.5 - 22.3 95% C.I.)	(46) 16.6 % (12.4 - 21.9 95% C.I.)	0.780
Prevalence of severe malnutrition	(42) 7.2 %	(26) 8.4 %	(16) 5.8 %	0.256

[11] WHO/UNICEF Cut Off Points wasting using Z-Score (-2 Z scores in populations: <2.5% - very low;2.5-<5%, - Low; 5<10% - Medium;10<15% -High;>15%-very High)

(<-3 z-score and/or oedema)	(5.1 - 9.9 95% C.I.)	(5.8 - 12.0 95% C.I.)	(3.2 - 10.2 95% C.I.)	

The prevalence of oedema is 0.0 %

5.3. Prevalence of acute malnutrition by age, based on WHZ scores and/or oedema

Prevalence of acute malnutrition by age, based on weight-for-height z-scores data shows that, severe wasting was more prevelant in 6-23 months children than other age group, similarly in moderate wasting was most commonly prevalent in the same age group.

Table 7:Prevalence of acute malnutrition by age, based on weight-for-height z-scores and/or oedema

		Severe wasting (<-3 z-score)		Moderate wasting (>= -3 and <-2 z-score)		Normal (> = -2 z score)		Oedema	
Age (mo)	Total no.	No.	%	No.	%	No.	%	No.	%
6-23	219	29	13.2	56	25.6	134	61.2	0	0.0
24-29	71	4	5.6	12	16.9	55	77.5	0	0.0
30-41	148	7	4.7	16	10.8	125	84.5	0	0.0
42-53	120	1	0.8	13	10.8	106	88.3	0	0.0
54-59	28	1	3.6	3	10.7	24	85.7	0	0.0
Total	586	42	7.2	100	17.1	444	75.8	0	0.0

The table given below presents the distribution of acute malnutrition and oedema, on the basis of weight-for-height z-scores. None of the surveyed children had oedema. 8.1% marasmus cases found without clinical presence of oedema.

Table 8: Distribution of acute malnutrition and oedema based on weight-for-height z-scores

	<-3 z-score	>=-3 z-score
Oedema present	Marasmic kwashiorkor. 0 (0.0 %)	Kwashiorkor. 0 (0.0 %)
Oedema absent	Marasmic No. 48 (8.1 %)	Not severely malnourished. 547 (91.9 %)

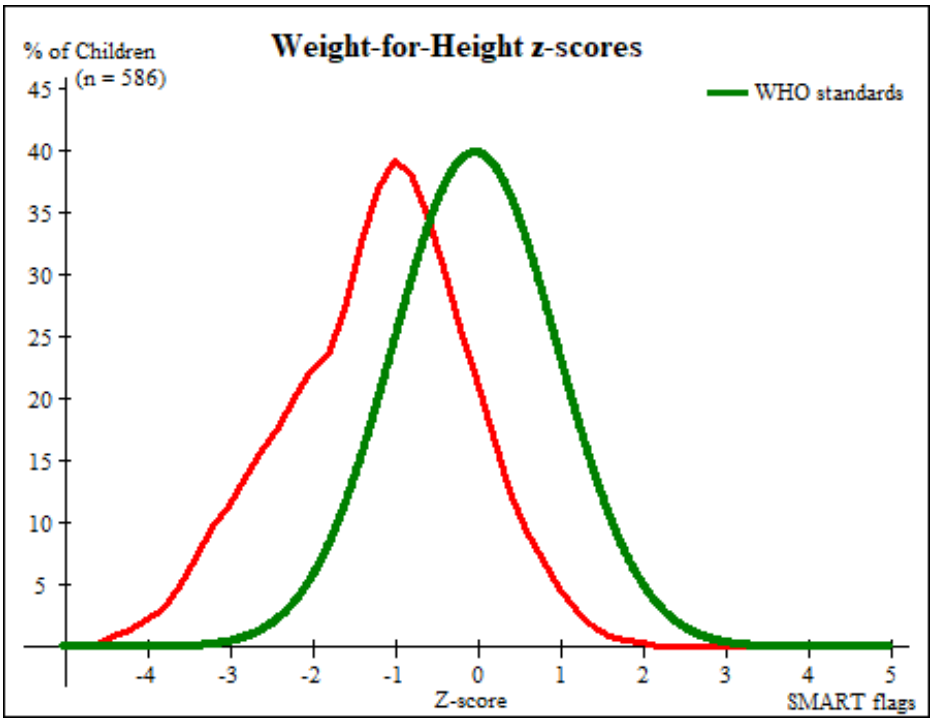

Figure 2: Gaussian Curve Weight-for-Height z score

The above figure shows the comparison of nutrition status of the 6 to 59 months in district Jacobabad and the reference population. The green curve represents the reference population while the red curve represents the surveyed population. The figure shows a significant shift to the left for the reference population which implies that malnourished children are more in surveyed population as compared to reference population.

5.4. Prevalence of acute malnutrition (Wasting) by Boys vs Girls based on MUAC cut offs (and/or oedema)

MUAC can be used as a proxy indicator of wasting and it is also found to be the good indicator for death. MUAC (<11.5 cm for children 6-59 months), is considered a high mortality risk and is a criterion for admission of outpatient therapeutic or patients treated for severe acute malnutrition. A MUAC reading of 11.5 cm to <12.5 cm is considered as moderate acute malnutrition. As shown in the table below, prevalence of Global malnutrition was 16.6%. The prevalence was slightly higher among girls (17.9%), as compared to boys (15.6%); however, this difference was not statistically significant (p value 0.552). The prevalence of Severe malnutrition was 5.5%.

It is worth mentioning the considerable difference between GAM prevalence identified through WHZ (24.2%) as opposed to 16.6% based on MUAC measurements. This implies a significant impact on the actual number of prevailing cases in the community which is 24.2% Vs the

admission criteria of CMAM programmes which considers MUAC only. This indicates a need for a national policy dialogue to contextualize the admission criteria for CMAM programmes as having MUAC criteria alone will result into a huge number missed cases that are actually malnourished but not detected by the MUAC parameter. The national technical thinktanks for nutrition should discuss the dynamics of body shapes specific to Pakistan and contextualize the recommendations for future programs. However, there is a need to strike balance between the disease burden and resources available as expanding the admission criteria to WHZ will significantly increase the caseload for CMAM programs.

Table 9: Prevalence of Acute Malnutrition (Wasting) by Boys vs Girls Based on MUAC cut offs (and/or oedema)

	All n = 595	Boys n = 315	Girls n = 280	P value
Prevalence of global malnutrition **(< 125 mm and/or oedema)**	(99) 16.6 % (13.1 - 20.9 95% C.I.)	(49) 15.6 % (11.5 - 20.8 95% C.I.)	(50) 17.9 % (12.5 - 24.8 95% C.I.)	0.552
Prevalence of moderate malnutrition **(< 125 mm and >= 115 mm, no oedema)**	(66) 11.1 % (8.5 - 14.3 95% C.I.)	(31) 9.8 % (6.9 - 13.9 95% C.I.)	(35) 12.5 % (8.8 - 17.5 95% C.I.)	0.323
Prevalence of severe malnutrition **(< 115 mm and/or oedema)**	(33) 5.5 % (4.0 - 7.7 95% C.I.)	(18) 5.7 % (3.8 - 8.4 95% C.I.)	(15) 5.4 % (3.1 - 9.1 95% C.I.)	0.839

5.5. Prevalence of acute malnutrition by age groups, based on MUAC cut off and/or oedema

Further analysis was performed based on prevalence of acute malnutrition by MUAC based on age as indicated in Table 10. Children in age groups 6-23 months, and moderate was found in the same age group and the reason could be in appropriate feeding practices and food insecurity.

Table 10: Prevalence of acute malnutrition by age groups, based on MUAC cut off and/or oedema

		Severe wasting (< 115 mm)		Moderate wasting (>= 115 mm and < 125 mm)		Normal (> = 125 mm)		Oedema	
Age (mo)	Total no.	No.	%	No.	%	No.	%	No.	%
6-23	222	25	11.3	42	18.9	155	69.8	0	0.0
24-29	72	4	5.6	10	13.9	58	80.6	0	0.0
30-41	150	2	1.3	8	5.3	140	93.3	0	0.0
42-53	123	1	0.8	5	4.1	117	95.1	0	0.0
54-59	28	1	3.6	1	3.6	26	92.9	0	0.0
Total	595	33	5.5	66	11.1	496	83.4	0	0.0

5.6. Prevalence of combined GAM and SAM based on WHZ and MUAC cut offs

The table below presents the prevalence of combined Global Acute Malnutrition (cGAM) 28.7% (24.2 – 33.8 95% C.I.), and Severe Acute Malnutrition (SAM) 10.8% (7.8 – 13.3 95% C.I.) based on different anthropometric indicators, namely Weight-for-Height Z-score (WHZ) and Mid-Upper Arm Circumference (MUAC) cut-offs, as well as the presence of edema. The data is categorized by gender, with the total number of participants (n) being 595, out of which 315 are boys and 280 are girls.

The data shows the proportion of children experiencing both GAM and SAM based on the defined anthropometric criteria. It appears that the prevalence of GAM and SAM is slightly higher among boys compared to girls, but the difference is not statistically significant as indicated by the P-values (0.504 and 0.659).

Table 11: Prevalence of combined GAM and SAM based on WHZ and MUAC cut offs (Boys vs Girls)

	All n = 595	Boys n = 315	Girls n = 280	P value
Prevalence of combined GAM **(WHZ <-2 and/or MUAC < 125 mm and/or oedema)**	(171) 28.7 % (24.2 - 33.8 95% C.I.)	(95) 30.2 % (24.7 - 36.3 95% C.I.)	(76) 27.1 % (20.5 - 34.9 95% C.I.)	0.504
Prevalence of combined SAM **(WHZ < -3 and/or MUAC < 115 mm and/or oedema**	(61) 10.3 % (7.8 - 13.3 95% C.I.)	(34) 10.8 % (8.0 - 14.3 95% C.I.)	(27) 9.6 % (6.0 - 15.0 95% C.I.)	0.659

*With SMART or WHO flags a missing MUAC/WHZ or not plausible WHZ value is considered as normal when the other value is available

The table given below presents details of children having GAM and SAM, with respect to the criteria for GAM and SAM, like MUAC value and weight for height.

Table 12: Distribution of children according to criteria for combined GAM and SAM

	GAM		SAM	
	no.	**%**	**no.**	**%**
MUAC	**29**	**4.9**	**19**	**3.2**
WHZ	**72**	**12.1**	**28**	**4.7**
Both	**70**	**11.8**	**14**	**2.4**
Edema	**0**	**0.0**	**0**	**0.0**
Total	**171**	**28.7**	**61**	**10.3**

5.7. Prevalence of underweight based on weight-for-age z-scores by sex

Underweight is defined as low weight for age relative to NCHS and WHO reference median. Children with weight for age less than -2 SD in relation to a reference child are classified as underweight while those with less than -3 SD are classified as severe underweight. The prevalence of underweight among children under 6 to 59 months in district Jacobabad was 33.9% (28.4-39.9 95% C.I.), while those who were severely underweight was 16.5% (12.8 – 21.0 95% C.I.). Analysis by sex shows no significant difference in boys and girls ($p < 0.097$); both genders are at equal risk of malnutrition with prevalence of 38.1% (31.1 -145.5 95% C.I.), and 29.3% (22.3 – 37.4 95% C.I.) respectively.

Table 13: Prevalence of underweight based on weight-for-age z-scores by Boys vs Girls

	All n = 575	Boys n = 302	Girls n = 273	P value
Prevalence of underweight **(<-2 z-score)**	(195) 33.9 % (28.4 - 39.9 95% C.I.)	(115) 38.1 % (31.1 - 45.5 95% C.I.)	(80) 29.3 % (22.3 - 37.4 95% C.I.)	0.097
Prevalence of moderate underweight **(<-2 z-score and >=-3 z-score)**	(100) 17.4 % (13.3 - 22.4 95% C.I.)	(60) 19.9 % (14.5 - 26.5 95% C.I.)	(40) 14.7 % (10.2 - 20.6 95% C.I.)	0.196
Prevalence of severe underweight **(<-3 z-score)**	(95) 16.5 % (12.8 - 21.0 95% C.I.)	(55) 18.2 % (13.9 - 23.6 95% C.I.)	(40) 14.7 % (9.6 - 21.7 95% C.I.)	0.365

The table given below presents the prevalence of underweight by age, based on weight for age z-scores. As shown in Table 14, the highest proportion of severe underweight children was in age group 6-23 months (21.4%), followed by 19.7% in 24-29 months age group. For moderate underweight, the highest proportion of children was in age group 6-23 months (21.0%).

Table 14: Prevalence of underweight by age, based on weight-for-age z-scores

		Severe underweight (<-3 z-score)		Moderate underweight (>= -3 and <-2 z-score)		Normal (> = -2 z score)		Oedema	
Age (mo)	**Total no.**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**
6-23	**210**	**45**	**21.4**	**44**	**21.0**	**121**	**57.6**	**0**	**0.0**
24-29	**71**	**14**	**19.7**	**12**	**16.9**	**45**	**63.4**	**0**	**0.0**
30-41	**148**	**21**	**14.2**	**25**	**16.9**	**102**	**68.9**	**0**	**0.0**
42-53	**120**	**14**	**11.7**	**17**	**14.2**	**89**	**74.2**	**0**	**0.0**
54-59	**26**	**1**	**3.8**	**2**	**7.7**	**23**	**88.5**	**0**	**0.0**
Total	**575**	**95**	**16.5**	**100**	**17.4**	**380**	**66.1**	**0**	**0.0**

5.8. Prevalence of stunting based on height-for-age z-scores by sex

Stunting is an indicator of chronic (long-term) malnutrition which is mainly due to long-term food deprivation, deficiency of micronutrients, recurrent illness, and other socio-economic factors that affect normal growth. WHO defines height-for-age as less than -2 SD from the median height age reference population. Inadequate infant and young child feeding and maternal undernutrition results in childhood stunting. Stunting is associated with impaired neurocognitive development, a risk maker of non-communicable diseases, and reduced productivity later in life. Height for age z-score was 47.7 % (38.50 – 49.9 95% C.I.); findings suggested that this rate classified as very high[12]. Stunting was higher among boys 46.7% (40.0 – 53.6 95% C.I.) than girls 41.2% (33.5 – 49.4 95% C.I.). However, the p-value of 0.295 shows that the difference was not statistically significant.

Table 15: Prevalence of stunting based on height-for-age z-scores and by sex

	All n = 553	Boys n = 291	Girls n = 262	P value
Prevalence of stunting **(<-2 z-score)**	**(244) 47.7 %** **(38.5 - 49.9 95% C.I.)**	**(136) 46.7 %** **(40.0 - 53.6 95% C.I.)**	**(108) 41.2 %** **(33.5 - 49.4 95% C.I.)**	0.295
Prevalence of moderate stunting **(<-2 z-score and >=-3 z-score)**	**(133) 24.1 %** **(20.0 - 28.7 95% C.I.)**	**(74) 25.4 %** **(20.1 - 31.6 95% C.I.)**	**(59) 22.5 %** **(17.3 - 28.8 95% C.I.)**	0.473
Prevalence of severe stunting **(<-3 z-score)**	**(111) 20.1 %** **(16.3 - 24.5 95% C.I.)**	**(62) 21.3 %** **(16.5 - 27.1 95% C.I.)**	**(49) 18.7 %** **(13.1 - 25.9 95% C.I.)**	0.531

The table given below presents the prevalence of stunting by age, based on height for age z-scores. As shown in Table 16 the highest proportion of severe stunting was in 24.29 months old children (29.9%), followed by 22.5% in 30.41 months age group. For moderate stunting, the highest proportion of children was in age group 54-59 months (32.0%).

[12]WHO/UNICEF Cut Off Points for stunting using Z-Score (-2 Z scores in populations:<2.5% - Very low; 2.5-<10% - Low; 10-<20% - Medium; 20- <30% - High; >30% - Very High)

Table 16: Prevalence of stunting by age based on height-for-age z-scores

		Severe stunting (<-3 z-score)		Moderate stunting (>= -3 and <-2 z-score)		Normal (> = -2 z score)	
Age (mo)	Total no.	No.	%	No.	%	No.	%
6-23	201	42	20.9	39	19.4	120	59.7
24-29	67	20	29.9	17	25.4	30	44.8
30-41	142	32	22.5	34	23.9	76	53.5
42-53	118	16	13.6	35	29.7	67	56.8
54-59	25	1	4.0	8	32.0	16	64.0
Total	553	111	20.1	133	24.1	309	55.9

The table below presents data related to z-scores, design effects, and excluded subjects for three different indicators: Weight-for-Height, Weight-for-Age, and Height-for-Age. Z-scores are measures of how far a child's anthropometric measurement deviates from the standard reference population, with z-scores less than -2 indicating malnutrition. The z-scores for Weight-for-Height (WHZ) and Weight-for-Age (WAZ) were not available for children with edema, which could be due to the difficulty in accurately measuring weight and height in such cases.

The mean z-scores provide an overview of the nutritional status of the subjects, with negative values indicating that, on average, the children in the study have lower measurements compared to the standard reference population. Overall, the data highlights the prevalence of malnutrition among the subjects and emphasizes the importance of monitoring and addressing nutritional status in this population.

Table 17: Mean z-scores, Design Effects and excluded subjects

Indicator	n	Mean z-scores ± SD	Design Effect (z-score < -2)	z-scores not available*	z-scores out of range
Weight-for-Height	586	-1.21±1.09	1.43	0	9
Weight-for-Age	575	-1.93±1.13	2.14	0	20
Height-for-Age	553	-1.94±1.28	1.84	0	42

* contains for WHZ and WAZ the children with edema

5.9. Prevalence of overweight based on WHZ and by sex (no oedema)

Overweight or obesity defined as weight-for-height Z score >+2SD from the median according to WHO growth reference standards 2006. Findings show that prevalence was 0.00%. Results also imply that severe overweight findings were not found in any of the group.

Table 18: Prevalence of overweight based on WHZ and by sex (no oedema)

	All n = 586	Boys n = 309	Girls n = 277
Prevalence of overweight (WHZ > 2)	(0) 0.0 % (0.0 - 0.0 95% C.I.)	(0) 0.0 % (0.0 - 0.0 95% C.I.)	(0) 0.0 % (0.0 - 0.0 95% C.I.)
Prevalence of severe overweight (WHZ > 3)	(0) 0.0 % (0.0 - 0.0 95% C.I.)	(0) 0.0 % (0.0 - 0.0 95% C.I.)	(0) 0.0 % (0.0 - 0.0 95% C.I.)

5.10. Severity of malnutrition among children aged 6-59 months

The survey provides information on the severity of malnutrition among children aged 6-59 months, based on the WHO/UNICEF classification from 2018. The findings reveal a worrisome situation regarding malnutrition among children aged 6-59 months. The prevalence of wasting and stunting falls under very high category, and underweight indicating alarming situation.

Table 19: Severity of malnutrition among children aged 6-59 months

Indicators	Prevalence	Severity
Wasting [WHZ]	24.2.0%	**Very High**
Overweight [WHZ]	0.0%	**Very low**
Stunting [HAZ]	47.7%	**Very High**
Underweight [WAZ]	33.9%	**Alarming/critical**

The Findings of survey are explained as under:

Wasting: Findings indicate that a sizeable proportion of children in this age group suffer from wasting, which refers to a low weight-for-height ratio. The prevalence of 24.2% suggests a concerning level of malnutrition in terms of wasting considered Very High. Also the prevalence of combined Global Acute Malnutrition (GAM) is also critical.

Over Weight: According to the data, there were no cases of overweight children in this age group. This finding suggests that the prevalence of overweight is extremely low among children aged 6-59 months.

Stunting: The data indicates that a considerable percentage (47.7%) of children suffer from stunting. Stunting refers to a low height-for-age ratio and reflects chronic malnutrition. The high prevalence suggests a concerning level of stunting among children in this age group considered very high.

Underweight: The prevalence of underweight children is 33.9%, indicating a Critical level of under nutrition in terms of weight-for-age. The severity is categorized as "Alarming," which needs to be addressed, considered very high

Combined GAM and SAM based on WHZ score and MUAC data;

Data shows that prevalence of wasting based on MUAC tool and WHZ score show high number of cases reported in data. The GAM prevalence was 28.7% recorded and SAM prevalence was 10.3% still under low to medium level category.

These findings underscore the need for interventions and policies aimed at addressing malnutrition and improving the nutritional status of children in this age group.

5.11. Retrospective Mortality

Based on the information collected, the overall Crude Death Rate (CDR) is 0.44%, with a range of CI 0.23 – 0.86%. This means that out of the total population, a small percentage of people have died within the given period. The CDR is a measure of the total number of deaths in a population, usually expressed per 1,000 or 10,000 people.

In comparison, the Under 5 death rate (U5DR) is lower at 0.32% death/10,000/day. The U5DR specifically focuses on deaths of children under the age of five. This rate indicates the number of deaths among children under five years old per 10,000 children per day.

It is mentioned that both the CDR (0.44) and U5DR (0.32) are well below the public health emergency thresholds of 1 and 2 deaths/10,000/day, respectively. These thresholds serve as indicators to monitor the severity of a public health situation. In this case, the death rates are below the thresholds, suggesting that the overall mortality and child mortality rates are not alarming from a public health perspective. Household level questions were asked to determine the cause of each death, under the broad categories of illness or injury/trauma. (100%) of the deaths were caused by illness; while injury/trauma and unknown cases accounted for the remaining 0% deaths respectively. Data shows that 100% deaths occurred in current location.

Table 20: Retrospective Mortality

	Crude Death Rate (95% CI)		Design Effect
Overall	**0.44 (0.23-0.86)**		**1.57**
Sex			
Male	**0.61 (0.29-1.29)**		**1.4**
Female	**0.26 (0.10-0.68)**		**1**
Years			
Under 5 Children (0-4 years)	**0.32 (0.08-1.30)**		**1**
Cause of death	**%**	**Location of death**	**%**
		1] In current location	**100**
Illness	**100**		

* (1st June 2023/Summer vacations] was used as the beginning of the mortality recall period. All household members present during recall period adjusted for in and out-migration.

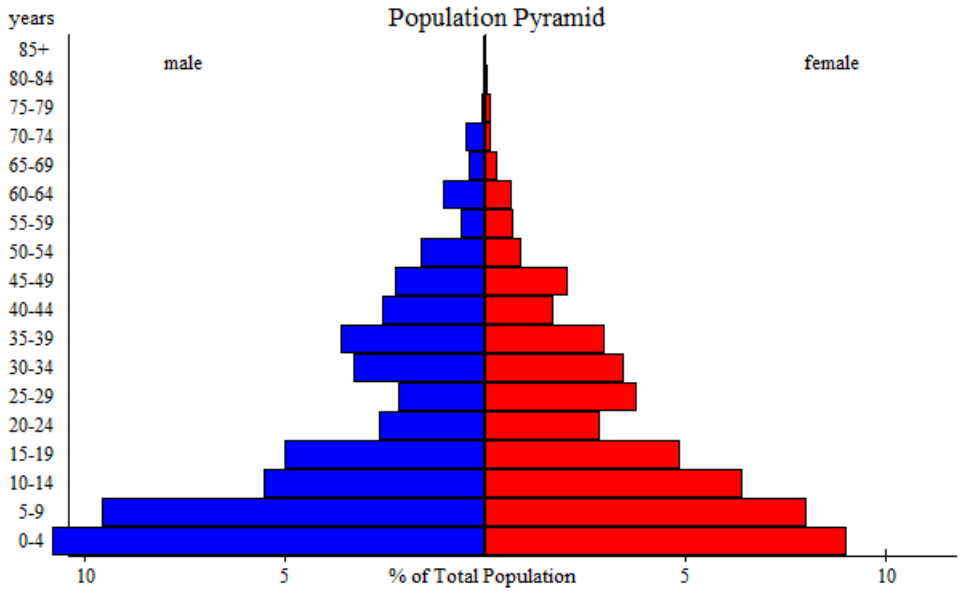

Figure 3 Population Pyramid of mortality data

Population pyramid data implies that, mortality ratio in male specifically was found higher than females in district Jacobabad.

5.12. Maternal Health and Nutrition Status

5.12.1. Maternal Nutrition Status

Pregnancy and breastfeeding are times when the body requires more nutrients, relying less on its reserves if the nutrient intake doesn't increase. Instead, the body adjusts by enhancing how it absorbs and uses nutrients. However, insufficient nutrient intake during these phases can negatively impact both the mother and the developing child.

During pregnancy, the recommended nutrient intake rises to support the fetus's growth and development. Similarly, breastfeeding demands extra energy, protein, and nutrients for milk production. Inadequate nutrient intake during breastfeeding can result in nutrient deficiencies for the mother, reduced milk production, and hindered infant growth and development.

It's crucial to monitor the nutritional well-being of pregnant and breastfeeding women to safeguard their health and that of their infants. The Mid-Upper Arm Circumference (MUAC) measurement serves as one method to assess nutritional status in specific settings. MUAC offers a simple way to identify acute malnutrition in adults, including pregnant and breastfeeding women. However, it's important to note that MUAC alone doesn't offer a comprehensive evaluation of overall nutritional status, and other measurements and factors should be taken into consideration.

The following table displays the physiological status of women of reproductive age interviewed. It illustrates the percentages of women currently pregnant, breastfeeding, and those who are both pregnant and breastfeeding. 11.30% of women are currently pregnant (Table 21). MUAC measurement is frequently used as an indicator of nutritional status, and a measurement below 21.0 cm suggests a higher risk of malnutrition. Data indicates that among 593 women, 291 were either pregnant or lactating out of which 16.1% (47 PLWs) were identified with MUAC<21cm .

Table 21. Physiological Status of Women of Reproductive Age and Malnutrition Status

Current Physiological status	N	n	%	CI 95%	
Currently lactating	593	224	37.77	33.96	41.47
Currently pregnant	593	67	11.30	9.00	14.10
Pregnant & lactating	593	3	0.51	0.17	1.48
Not Pregnant and Lactating	593	299	50.42	46.41	54.43
Women currently malnourished (MUAC <210 mm)	291	47	16.10	9.89	24.0

5.12.2. Women's Education Status

Table below shows the women's education status, among the 485 women surveyed, 3.71% (with a CI of 2.36% to 5.79%) had received primary education. This indicates that a negligible proportion had completed education up to the primary level, about 2.27% (with a CI of 1.27 to 4.02%) had completed secondary education. This percentage signifies a smaller subset of the surveyed population attained education up to the secondary level. A substantial majority,

approximately 91.34% (with a CI of 88.50% to 93.53%), had never been to school which is alarming and needs special attention by the policy makers with smart commitments for girls education. This indicates that a significant portion of the surveyed women did not have any formal education. A very small percentage, 1.24% (CI: 0.57% to 2.67%), had achieved education up to higher secondary level, and an even smaller percentage, 1.44% (CI: 0.70% to 2.95%), had graduated.

Table 22. Women's Education Status

Education Status	N	n	%	CI 95%	
Primary	485	18	3.71	2.36	5.79
Secondary	485	11	2.27	1.27	4.02
Never been to School	485	443	91.34	88.50	93.53
Higher Secondary	485	6	1.24	0.57	2.67
Graduation	485	7	1.44	0.70	2.95

5.12.3. Access to Antenatal Care (ANC) Services

Iron/Folic Acid Supplementation during Pregnancy:

Iron and folic acid are crucial supplements during pregnancy to prevent anemia and ensure proper fetal development. The data suggests that approximately 76.1% of the surveyed women received these supplements during their pregnancies. This is essential for maternal and fetal health.

Family Planning Methods Knowledge:

Family planning knowledge is vital for women's reproductive health. The data shows that around 64.4% of the surveyed women had knowledge about various family planning methods. Educating women about family planning can empower them to make informed decisions about their reproductive health.

Support from Family Members during Pregnancy-Lactation Period:

Support from family members plays a significant role in a woman's journey through pregnancy and lactation. The data indicates that 46.6% of the surveyed women felt supported by their family members during this critical period. Improved family support can positively impact maternal mental and emotional health.

Place of Last Delivery:

The data categorizes the place of delivery into three categories: Dai/TBA, Hospital, and Home. It's observed that a low percentage of deliveries (1.8%) occurred with Dai/TBA, while a significant portion (39.6%) took place in hospitals. However, a considerable number of deliveries (13.4%) still happened at home. Access to skilled healthcare professionals during childbirth, as provided in hospitals, is crucial for safe deliveries and reducing maternal and infant mortality.

Access to Healthcare Facilities (HFs):

Access to healthcare facilities within a reasonable distance is crucial for maternal and child health. The data highlights that a high percentage (95.05%) of surveyed women had physical access to healthcare facilities within a distance of less than 5 km. Conversely, only a small percentage (4.95%) had health facilities at distances beyond 6 km, indicating potential challenges for those women in accessing timely healthcare services.

Recall of Maternal, Infant, and Child Health (MICYF) Key Messages:

The ability of women to recall key messages related to maternal, infant, and child health was relatively high at 84.4%. This suggests that a significant portion of the surveyed women retained important health-related information.

Sources of Key Messages:

The sources from which women received key messages regarding maternal and child health vary. Family friends (82.37%) emerged as the primary source which shows the impact of peer education transfer, followed by doctors/nurses (16.18%). However, the low percentage of health education received from any formal health sector is an eyeopener and calls for immediate attention to add health education within all health cadres responsibilities. Secondly the reliance for health education on family and friends has a high probability of incorrect, falsified information which can be even more harmful than having no information. This indicates that informal social networks play a significant role in disseminating health-related information, while healthcare professionals also contribute significantly.

In summary, the data underscores both positive aspects and areas for potential improvement in maternal healthcare services. While a majority received essential supplements during pregnancy and had knowledge about family planning, the data also reveals disparities in access to skilled care during childbirth and varying sources of health information. Addressing these disparities could help improve overall maternal and child health outcomes.

Table 23. Access to Maternal services

Access to Maternal services	N	n	%	95% CI	
Iron/folic acid supplementation during pregnancy	472	359	76.1	71.95	79.84
Family Planning methods knowledge	472	304	64.4	56.38	64.38
Women felt supported from family members during pregnancy-lactation period	472	220	46.6	42.04	51.23
Place of last Delivery-Dai/TBA	455	8	1.8	0.76	3.44
Place of last Delivery-Hospital	455	180	39.6	35.04	44.22
Place of last Delivery-Home	455	61	13.4	10.41	16.89
Access to HFs <5 km	485	461	95.05	92.74	96.65
>6 Km	485	24	4.95	3.35	7.24
Women can recall MICYF Key Messages	455	61	84.4	80.78	87.60
Sources of Key Messages **CHWs/LHWs** **Doctors/Nurses** **Family Friend** **Media/Radio**	 414 414 414 414	 5 67 341 1	 1.21 16.18 82.37 0.24	 0.52 12.95 78.40 0.04	 2.80 20.04 85.74 1.36

Perceived Importance of IFA/MNT Tablets:

Agreement Levels: A significant portion of the respondents showed a positive attitude towards the importance of IFA/MNT tablets, with 36.84% strongly agreeing and 48.74% agreeing, totaling approximately 89.7% expressing some level of agreement.A small percentage remained neutral (4.12%), and a lesser proportion disagreed (0.92% disagreed).

Consumption of IFA/MNT Tablets:

This data indicates the responses of individuals regarding their consumption of IFA tablets during a certain period, likely during pregnancy or as prescribed for health reasons. Below is a breakdown of the interpretations:

Don't Know (1.2%): This percentage represents individuals who are uncertain or have no awareness of whether they have consumed IFA tablets. It's possible that they might not have accurate information or might not remember their IFA tablet consumption status.

No (50.5%): This percentage signifies individuals who reported that they did not consume IFA tablets. Reasons for not consuming could vary, including non-availability of stocks at health facility, forgetting, negligence, or possibly due to lack of access or understanding about the importance of IFA tablets during pregnancy or other health-related contexts.

Partially (3.27%): This percentage reflects individuals who have consumed IFA tablets partially, indicating that they might not have consistently followed the prescribed regimen or may have missed doses.

Yes (45%): This percentage represents individuals who reported consuming IFA tablets as prescribed or recommended. They have adhered to the regimen and have taken the supplements as advised, which is crucial for maternal and fetal health during pregnancy.

Interpreting this data suggests that while a significant portion of the respondents have consumed IFA tablets as recommended, there's also a notable proportion who either did not consume them or only partially followed the prescribed regimen. Comparing the IFA compliance data with the number of pregnant who received IFA, it shows that 45% of the total recipients (76.1%) of IFA utilized as per the recommended dosage which in actual turns out to be only 34% of the total Pregnant women. This highlights potential areas for improvement in education, accessibility, and support mechanisms to ensure better adherence to IFA supplementation, particularly among pregnant women and individuals in need of such supplementation for health reasons.

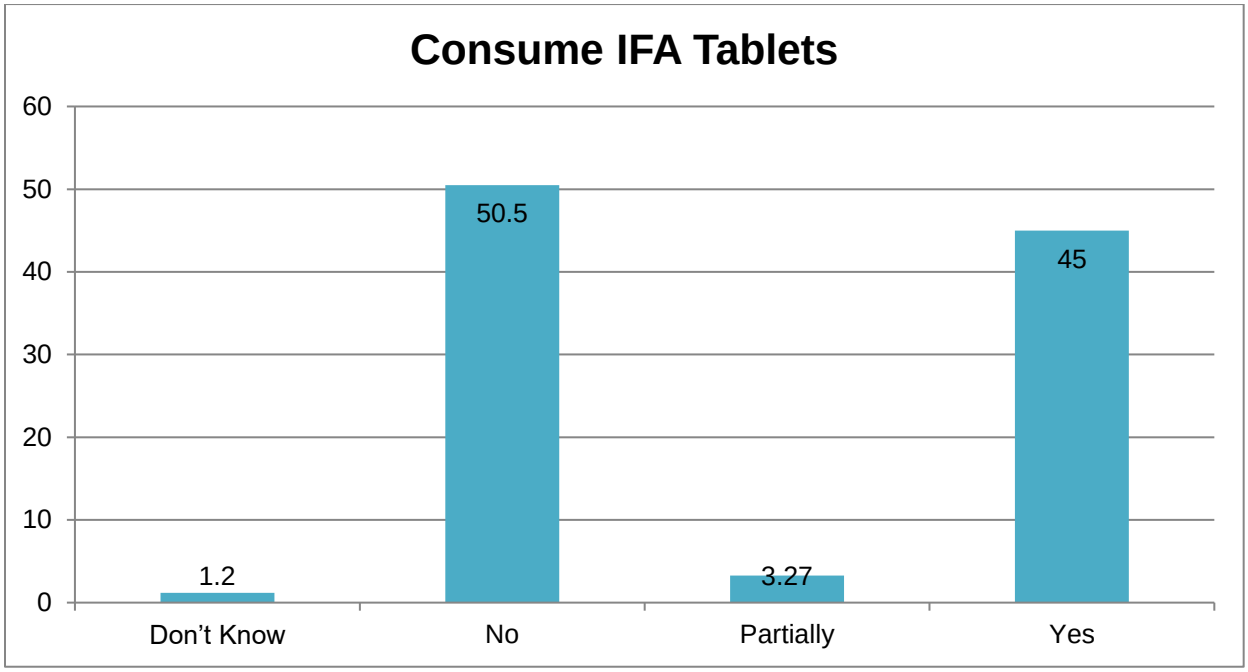

Figure 4 Consume IFA Tablets

5.13. Child Immunization Services

Having the third-highest burden of child mortality and ranking third globally for the most under-vaccinated children, Pakistan contains 15% of its population under the age of five, which accounts for 50% of the mortality rate in this country. Every year, almost three million children miss out on

an entire course of the most readily available vaccines, leaving them vulnerable to life-threatening diseases[13].

Table 24. Child Immunization status

Child Immunization				
Indicators	**N**	**n**	**Percent**	**95% CI Value**
Deworming Coverage –Children 12-59 m	552	96	17.4	(14.32-20.82)
Vitamin-A Coverage-Children 6 59 m	594	359	60.4	(56.38-64.39)
Measles with Card 9-59 m	577	117	20.3	(17.07 -23.79)
Measles with Recall 9-59 m	577	293	50.8	(46.62 – 54.93)
Number of Diarrhea Episodes 1-5 Episodes >5 Episodes Not Applicable	184		 13.04 21.20 65.76	 (15.53 – 27.82) (8.54 – 18.78) (58.42 – 72.58)
Diarrhea Treatment with Zinc or ORS 0-59 m	187	23	12.30	7.96 – 17.88

Deworming Coverage – Children 12-59 months: Out of 552 children within the age range of 12 to 59 months, only 17.4% received deworming treatment. The confidence interval (CI) suggests that the actual coverage may range from 14.32% to 20.82%. Deworming is essential to prevent parasitic infections in children.

Vitamin-A Coverage – Children 6 to 59 months: Among 594 children between the ages of 6 to 59 months, 60.4% received Vitamin-A supplementation. The confidence interval spans from 56.38% to 64.39%. Vitamin-A supplementation is crucial for immune function and vision.

Measles with Card 9-59 months: Out of 577 children aged 9 to 59 months, only 20.3% had documented measles vaccination cards. The confidence interval ranges from 17.07% to 23.79%.

Measles with Recall 9-59 months: For the same age group (9 to 59 months), 50.8% of children were recalled by their caregivers to have received measles vaccination. The confidence interval is between 46.62% and 54.93%. This indicates a higher recall rate than documented through vaccination cards.

Number of Diarrhea Episodes: Among the surveyed group (with a subset of 184 responses):

- 13.04% reported experiencing 1 to 5 episodes of diarrhea.
- 21.20% reported experiencing more than 5 episodes.
- 65.76% stated not applicable or did not report diarrhea episodes. The confidence intervals for the reported percentages vary as mentioned in parentheses.

Diarrhea Treatment with Zinc or ORS 0-59 months: Out of 187 children aged 0 to 59 months with diarrhea, only 12.30% received treatment with Zinc or Oral Rehydration Solution (ORS). The

[13] https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8684801/

confidence interval for this percentage ranges from 7.96% to 17.88%. Both Zinc and ORS are essential treatments for managing diarrheal episodes in children.

The data highlights gaps in various areas of child health and immunization. While Vitamin-A coverage appears relatively higher, other essential interventions such as deworming, measles vaccination, and adequate treatment for diarrheal episodes (using Zinc or ORS) seem to be lower than desired.

There's a need for increased coverage and accessibility to crucial interventions like deworming, measles vaccination, and proper management of diarrheal episodes to enhance child health outcomes within the surveyed population.

Family Planning knowledge and Practices

Mother's Knowledge Regarding Family Planning Method

Overall, these figures illustrate the distribution of responses from mothers regarding their knowledge about family planning methods. A majority of the mothers responded positively (64.41%), indicating they have knowledge about these methods. However, a significant portion either responded negatively (34.53%), indicating a lack of knowledge, or expressed uncertainty (0.64%). Additionally, there was a very small proportion (0.42%) where the question might not have been relevant or applicable.

Table 25 Mother's Knowledge Regarding Family Planning methods

Indicators	n	%	95% CI
Don't Know	3	0.64	0.22 – 1.85
No	163	34.53	30.38 – 38.93
Not Applicable	2	0.42	0.12 – 1.53
Yes	304	64.41	59.99 – 68.59

Previous history of using Family Planning Method

Condoms (14 individuals): Condoms are a barrier method of contraception. Their usage might be influenced by preferences for protection against sexually transmitted infections (STIs) as well as contraception.

Implants (16 individuals): Implants are small, flexible rods placed under the skin, offering long-term contraception. They are effective for several years and can be removed if desired.

IUDs (Intrauterine Devices) (10 individuals): IUDs are long-acting reversible contraceptives inserted into the uterus. They can be hormonal or non-hormonal and offer contraceptive protection for several years.

Periodic Abstinence (13 individuals): Periodic abstinence involves avoiding intercourse during fertile periods of a woman's menstrual cycle. It's a method often associated with natural family planning techniques.

Pills (54 individuals): Contraceptive pills are hormonal medications taken daily to prevent pregnancy. They are among the most commonly used reversible methods of contraception.

None (231 individuals): This group represents individuals who haven't used any specific family planning method previously. The reasons could vary from not wanting to use contraception to lack of awareness, access, or personal circumstances.

Injectable (77 individuals): Injectable contraceptives are hormonal shots administered at regular intervals (e.g., Depo-Provera) offering contraceptive protection for weeks or months.

Sterilizations (9 individuals): Sterilization procedures, such as tubal ligation (for women) or vasectomy (for men), are permanent methods of contraception often chosen by individuals or couples who do not desire future pregnancies.

The data showcases a diverse range of contraceptive methods utilized by the surveyed individuals, reflecting a variety of preferences and choices based on individual circumstances. Some methods like pills and injectable appear to be more commonly utilized, possibly due to ease of access, familiarity, or effectiveness.

None: A significant portion (231 individuals) reported not using any family planning method previously. This could signify a gap in education, access to services, or personal choices related to contraception.

Consideration of Factors: The choice of contraceptive method often depends on factors like effectiveness, convenience, personal beliefs, medical considerations, and partner involvement. Understanding these preferences and utilization patterns is crucial for healthcare providers and policymakers to tailor family planning programs, improve accessibility to various methods, offer comprehensive information, and address any barriers preventing individuals from utilizing appropriate contraceptive methods for their reproductive health needs.

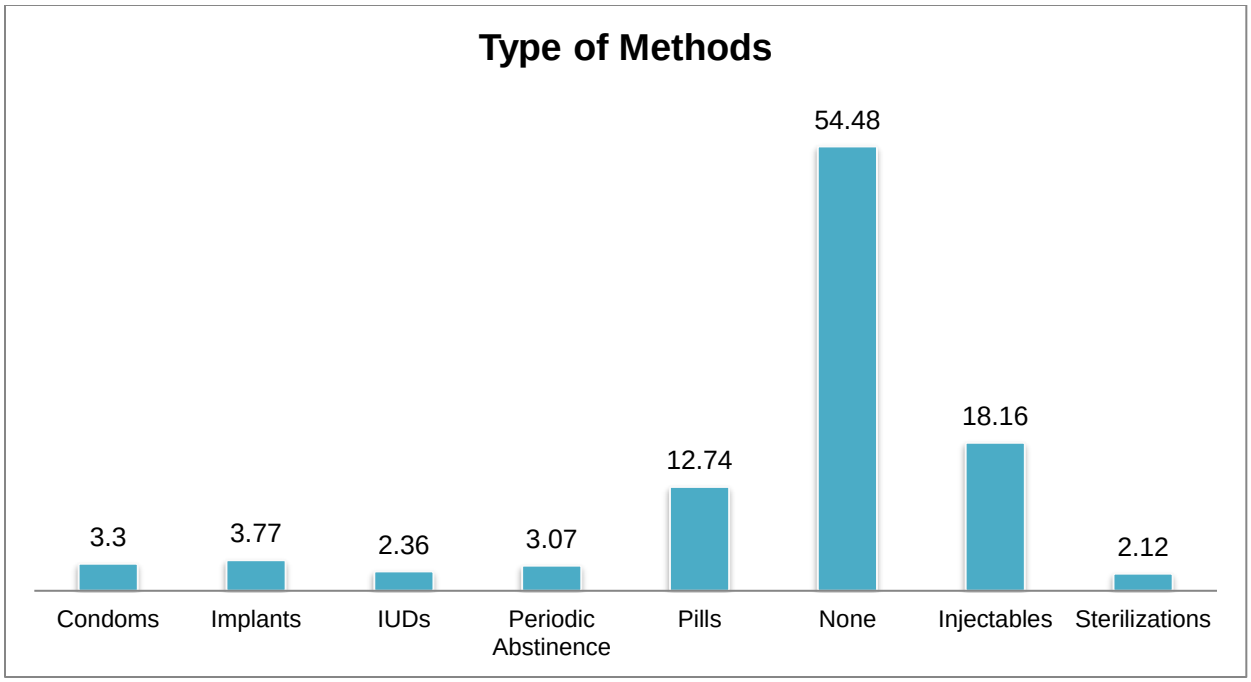

Figure 5 Type of Family Planning methods used by the women

Knowledge regarding Breast feeding

Opinion Regarding Duration of Exclusive Breastfeeding:

- 0-2 Months: 12 respondents (2.73%) believed that exclusive breastfeeding should be practiced for 0-2 months.
- 0-4 Months: 55 respondents (12.50%) believed that exclusive breastfeeding should be practiced for 0-4 months.
- 0-6 Months: 373 respondents (84.77%) believed that exclusive breastfeeding should be practiced for 0-6 months.

A significant majority (84.77%) understand and support the recommended duration of exclusive breastfeeding for the first six months of an infant's life, in line with global health recommendations by organizations like the WHO and UNICEF.

Age to stop breastfeeding:

- Before 6 Months: 1 respondent (0.21%) believes breastfeeding should stop before 6 months.
- After 6 Months: 13 respondents (2.74%) believe breastfeeding should stop after 6 months.
- 10-12 Months: 5 respondents (1.05%) believe breastfeeding should stop between 10-12 months.
- 13-15 Months: 15 respondents (3.16%) believe breastfeeding should stop between 13-15 months.
- 16-18 Months: 31 respondents (6.83%) believe breastfeeding should stop between 16-18 months.
- 18-21 Months: 6 respondents (1.32%) believe breastfeeding should stop between 18-21 months.
- >23 Months: 85.26% believe breastfeeding should continue beyond 23 months.

The majority of respondents (85.26%) support breastfeeding beyond 23 months, indicating an understanding of the benefits of prolonged breastfeeding for child health and development.

Frequency of breastfeeding:

- >11 times: 170 respondents (35.94%) breastfeed more than 11 times a day.
- 1-5 times: 57 respondents (12.05%) breastfeed 1-5 times a day.
- 6-10 times: 246 respondents (52.01%) breastfeed 6-10 times a day.
- A majority of respondents (87.95%) breastfeed 6 or more times a day, which aligns with the recommended frequency for breastfeeding newborns and infants.

The data suggests a positive understanding and adherence to recommended breastfeeding practices among the surveyed mothers, including awareness of the duration of exclusive breastfeeding for the first six months, support for extended breastfeeding beyond 23 months, and frequent breastfeeding sessions. These findings indicate a good level of knowledge and alignment with global recommendations regarding breastfeeding practices for optimal infant health and development.

Table 26. Mother's Knowledge Regarding Breastfeeding

Mother's Knowledge Regarding Breastfeeding

Indicators	n	Percent	95% CI Value
Opinion regarding duration of Exclusive Breastfed			
0-2 Months	12	2.73	1.57- 4.71
0-4 Months	55	12.50	9.73 – 15.92
0-6 Months	373	84.77	81.12 – 87.83
Age to stop breastfeeding			
After 6 Months	1	0.21	0.04 – 1.18
10-12 Months	13	2.74	1.61 -4.63
13-15 Months	5	1.05	0.45 – 2.44
16-18 Months	15	3.16	1.92-5.14
18-21 Months	31	6.83	4.64-9.11
>23 Months	6.83	85.26	81.7-88.17
Frequency of breastfeeding			
>11 times	170	35.94	31.75 – 40.36
1-5 times	57	12.05	9.42-15.29
6-10 times	246	52.01	47.51 – 56.48

5.14. Infant and Young Child Feeding-IYCF Key indicators

Table 27. MIYCF Key Indicators

Section 1. Summary of IYCF indicators[14]			
Indicators	**Frequency**	**Percent**	**95% CI**
Child Ever breastfed-EvBF 0-23m	237 (250)	94.8%	(91.2-97.20)
Early initiation of breastfeeding (EIBF) (0-23 M)	151 (250)	60.4%	(54.04-66.51)
Exclusively breastfed for the first two days after birth-(EBF2D) 0-23 M)	137 (250)	54.8%	(48.41-61.08)
Exclusive breastfeeding under six months (EBF) (0-5 M)	37 (44)	84.1%	(69.93-93.36)
Colostrum Given (0-23 M)	223(250)	89.2%	(84.68 – 92.76)
Continued breastfeeding (CBF) (12-23 M)	77 (122)	63.1%	(53.91 -71.67)
Introduction of solid, semisolid or soft foods (6–8 M) (ISSSF)	21 (32)	65.6%	(46.81 – 81.43)
Minimum dietary diversity 6–23 months (MDD)	13 (206)	6.3%	(3.40-10.55)
Minimum meal frequency 6–23 months (MMF)	14 (206)	6.8%	(3.77 -11.14)
Minimum acceptable diet 6–23 months (MAD)	13 (206)	6.3%	(3.40-10.55)
Egg and/or flesh food consumption 6–23 months (EFF)	24 (206)	11.65%	(7.61 – 16.84)
Bottle feeding 0–23 months (BoF)	123 (250)	49.2%	(42.84 -55.55)

Ever breastfed (EvBF) (0-24 Months): 237 out of 248 children (95.6%) in the 0-24 months age group have ever been breastfed. This high percentage indicates a prevalent practice of initiating

[14] https://iris.who.int/bitstream/handle/10665/340706/9789240018389-eng.pdf?sequence=1

breastfeeding among the surveyed children, showcasing widespread acceptance and adoption of breastfeeding.

Early initiation of breastfeeding (EIBF) (0-23 Months): 151 out of 250 children (60.4%) were breastfed within the first hour of birth. While over half the children were breastfed early after birth, the percentage suggests there might be room for improvement in promoting immediate breastfeeding initiation, as per global health recommendations.

Exclusively breastfed for the first two days after birth (EBF2D) (0-23 Months): 137 out of 250 children (54.8%) were exclusively breastfed for the first two days after birth. This statistic indicates that more than half the surveyed children received exclusive breastfeeding in the initial crucial days after birth, supporting early bonding and providing essential nutrients along with colostrum feeding secreted in the first 2-3 days.

Exclusive breastfeeding under six months (EBF) (0-5 Months): 37 out of 44 children (84.1%) aged 0-5 months were exclusively breastfed. This high percentage suggests good adherence to the recommendation of exclusive breastfeeding for infants up to 6 months of age, ensuring optimal nutrition and health for the infants.

Continued breastfeeding (CBF) (12-23 Months): 77 out of 122 children (63.1%) aged 12-23 months were continuing to breastfeed. A significant proportion of children in the 12-23 months age range are continuing to receive the benefits of breastfeeding, contributing to their nutritional intake and immune support.

Introduction of solid, semisolid, or soft foods (6–8 Months) (ISSSF): 21 out of 32 children (65.6%) aged 6-8 months were introduced to solid, semisolid, or soft foods. While a majority have started complementary feeding by the recommended age, there's potential for improvement in introducing these foods timely to ensure proper nutrition and development.

Minimum dietary diversity 6–23 months (MDD), Minimum meal frequency 6–23 months (MMF), Minimum acceptable diet 6–23 months (MAD), and Egg and/or flesh food consumption 6–23 months (EFF) These indicators represent aspects of a child's diet diversity, meal frequency, and quality.

This shows relatively low percentages (ranging from 6.3% to 10.4%), suggesting a need for improvement in meeting dietary diversity and nutritional adequacy among children aged 6-23 months.

Bottle feeding 0–23 months (BoF): 123 out of 250 children (49.2%) were reported to have been bottle-fed. The prevalence of bottle feeding in nearly half the surveyed children might indicate a reliance on bottles for feeding, potentially impacting breastfeeding practices and nutritional intake.

The data reflects generally positive adherence to some key breastfeeding and complementary feeding practices. However, it also highlights areas where there's room for improvement, such as early initiation of breastfeeding, dietary diversity, and limiting bottle feeding to ensure optimal nutrition and healthy feeding practices for infants and young children.

Table 28 Reasons for Stop Breastfeeding

Reasons for Stop Breastfeeding	n	%	95% CI
Became Pregnant	11	45.83	25.55 – 67.18
Mother Ill/weak	5	20.83	7.13 – 42.15
Child ill	5	20.83	7.13 – 42.15
Child refused	2	8.33	1.03 – 27.0
Weaning age	1	4.17	0.11 – 21.12

Became Pregnant: 11 individuals (45.83%) stopped breastfeeding due to becoming pregnant again. This reason indicates that subsequent pregnancies might lead mothers to discontinue breastfeeding, possibly due to concerns about managing breastfeeding alongside a new pregnancy or misconceptions about breastfeeding during pregnancy.

Mother Ill/Weak: 5 individuals (20.83%) stopped breastfeeding because the mother herself was ill or weak. Maternal health issues can significantly impact breastfeeding practices. Illness or weakness in the mother might affect her ability to breastfeed or her perception of the adequacy of her milk supply, leading to discontinuation.

Child Ill: 5 individuals (20.83%) stopped breastfeeding because the child was ill. Illness in the child might have affected their ability to breastfeed or created challenges that led to the discontinuation of breastfeeding.

Child Refused: 2 individuals (8.33%) stopped breastfeeding because the child refused to breastfeed. Child refusal to breastfeed might occur due to various reasons such as teething, changes in feeding preferences, or even as a response to a decrease in milk supply. This can lead to mothers ceasing breastfeeding.

Weaning Age: 1 individual (4.17%) stopped breastfeeding due to reaching the intended weaning age. This reason implies a planned cessation of breastfeeding at a predetermined age, indicating a deliberate decision by the mother to wean the child at a specific time.

The reasons cited for discontinuing breastfeeding reflect a range of factors, including maternal health, child health, subsequent pregnancies, and child preferences or developmental stages. Some reasons, such as becoming pregnant again or maternal health issues, are external factors impacting breastfeeding continuity. There needs an enhanced focus on family planning services to be ensured at the community level and integrated into the MNCH service package as subsequent pregnancy not only causes cessation of breastfeeding but increased health burden on the mother and the child. Child illness or refusal to breastfeed and reaching the intended weaning age are internal factors or personal choices influencing breastfeeding cessation. This data focused on the diverse reasons that can lead to the discontinuation of breastfeeding, highlighting the importance of addressing maternal and child health issues and supporting mothers with adequate information and assistance to maintain breastfeeding whenever possible, considering its numerous benefits for maternal and child health.

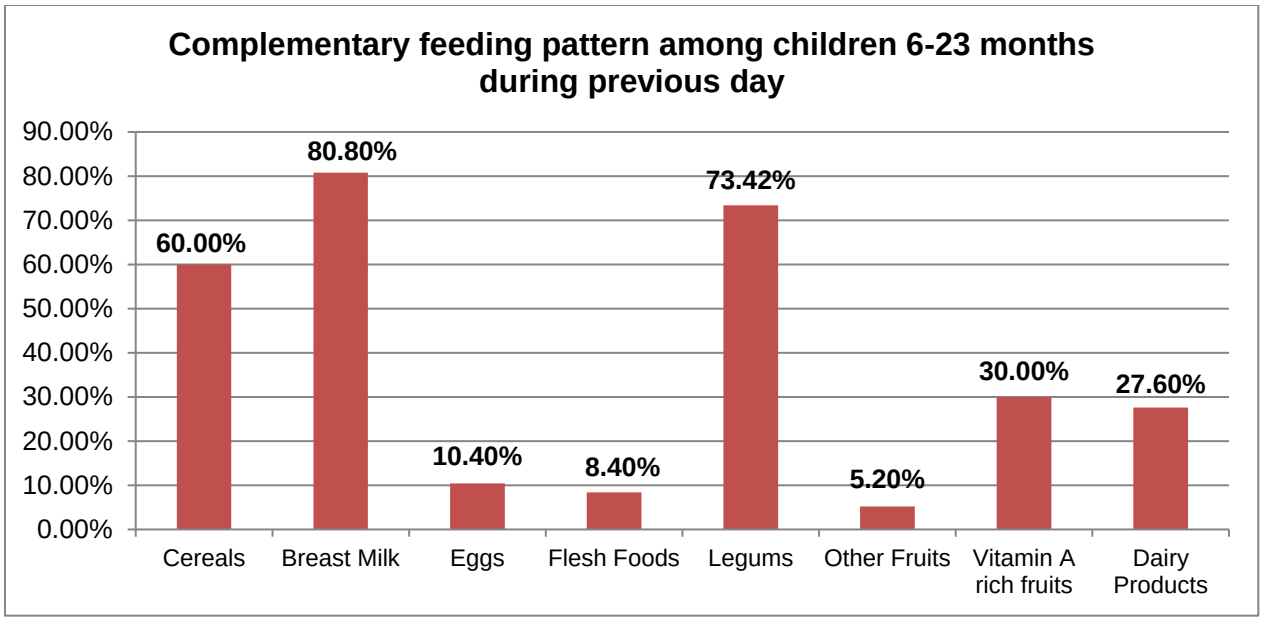

Figure 6. Complementary feeding pattern among children 6-23 months

Cereals (60.00%): Cereals are a significant part of the complementary diet for children, constituting 60% of the reported consumption. This includes grains like rice, wheat, maize, etc., which are commonly introduced as solid foods to infants.

Breast Milk (80.80%): Breast milk is reported to be part of the diet for 80.80% of children aged 6-23 months. This percentage indicates that breastfeeding is still a significant source of nutrition even as complementary foods are introduced, highlighting its continued importance for child nutrition and immunity.

Eggs (10.40%) and Flesh Foods (8.40%): Eggs and flesh foods, which include meats like poultry, fish, or red meat, constitute a lower percentage of the diet. Both sources of animal protein are essential for providing vital nutrients like iron, zinc, and protein to support growth and development.

Legumes (73.42%): Legumes, such as lentils, beans, or peas, are reported to be included in the diet for 73.42% of children. Legumes are excellent sources of protein, fiber, and various vitamins and minerals, contributing to a balanced diet.

Other Fruits (5.20%) and Vitamin A rich fruits (30.00%): Other fruits besides breast milk are consumed by 5.20% of children, whereas fruits rich in Vitamin A are consumed by 30% of them. Fruits provide essential vitamins, minerals, and antioxidants necessary for growth and immunity.

Dairy Products (27.60%): Dairy products, including milk, yogurt, or cheese, make up 27.60% of the diet. Dairy is a significant source of calcium and other nutrients vital for bone health and growth. The data indicates a varied but potentially limited dietary diversity among children aged 6-23 months in terms of complementary feeding.

While cereals, legumes, and breast milk are widely included, there's a relatively lower consumption of animal-source foods (eggs, flesh foods) and other fruits rich in Vitamin A. Encouraging a more diverse diet that includes a wider range of nutrient-rich foods, especially animal-source foods and fruits, could enhance the overall nutritional intake and support healthy growth and development among children in this age group. Improving dietary diversity through a balanced and varied diet is crucial during the complementary feeding phase to ensure children receive a wide array of essential nutrients for optimal growth, development, and health.

5.15. WASH

5.15.1. Access to drinking water source: The below data shows the respondants access to the water point from their home

No Time: 5.57% of the respondents (27 out of 485) reported not spending any specific time accessing their primary source of water. This could suggest that this group might have immediate access to water within their homes or very close proximity, requiring minimal time for retrieval.

1-10 minutes: Around 41.44% (201 out of 485) indicated spending between 1 to 10 minutes accessing their primary water source. This is a substantial portion and indicates a reasonable duration spent to collect water, possibly suggesting that they need to travel a short distance or wait in line to acquire water.

11-20 minutes: A small percentage of respondents, about 20.62% (100 out of 485), reported spending between 11 to 20 minutes to access their primary water source. This group likely travels a bit farther or waits longer for water compared to the previous category.

More than 20 minutes: An adequate percentage, 32.37% (157 out of 498), reported spending over 20 minutes to obtain water. This group probably has to travel a significant distance or endure substantial waiting times to access their primary water source.

Overall, the data demonstrates varying durations individuals spend in obtaining their primary water supply, ranging from no specific time to considerable durations, possibly reflecting different distances or waiting periods to access water sources within their communities.

Table 29. Time to cover the distance from house to main source of water

Duration	N	n	%	95% CI	
No Time	485	27	5.57	3.85	7.98
1-10 mints	485	201	41.44	37.14	45.88
11-20 mints	485	100	20.62	17.26	24.44
>20 mints	485	157	32.37	28.36	36.66

Household Water Collection by Adult Females: 327 individuals (67.4%) reported that adult females are responsible for household water collection. This statistic shows a prevalent practice

where adult females are primarily responsible for fetching water for households, indicating potential gender disparities in water-related chores.

Household Water Collection by Adult Males: 136 individuals (28.1%) reported adult males being responsible for household water collection. This suggests a proportion of households where adult males are involved in water collection, possibly in addition to or instead of females, indicating variations in gender roles concerning water-related tasks.

Gender disparities in water collection responsibilities are evident, with adult females largely responsible, but a portion of households also involving adult males. These findings highlight the need for interventions focused on water treatment, sanitation improvements, gender equality in household responsibilities, and addressing economic barriers to ensure better hygiene practices and public health outcomes within the surveyed population.

5.15.2. Source of Drinking water

Public tap/standpipe: 322 individuals (66.39%) access drinking water from public taps or standpipes. Public taps or standpipes are communal water sources usually connected to a municipal supply. This high percentage suggests that a majority of the surveyed population relies on a shared or communal water source for drinking purposes.

Hand pumps/borehole: 125 individuals (25.77%) access drinking water from hand pumps or boreholes.

Hand pumps and boreholes are manually operated systems or drilled wells that provide access to groundwater. This percentage indicates a significant portion of the population relies on groundwater for their drinking water needs.

Piped Connection to house: 5 individuals (1.03%) have a piped connection directly to their house for accessing drinking water. Having a piped connection to the house indicates a more convenient and direct water supply. However, the low percentage suggests that only a small fraction of the surveyed population has this level of direct access.

Tanker truck from protected source: 3 individuals (0.62%) receive drinking water from tanker trucks sourced from protected sources. Tanker trucks are used to transport water from protected sources (such as wells or reservoirs) to areas without direct access to piped water. The low percentage indicates limited reliance on this mode of water supply.

Water seller/kiosk: 30 individuals (6.19%) obtain drinking water from water sellers or kiosks. Water sellers or kiosks are small vendors selling water. This percentage indicates a portion of the population relies on purchased water from such vendors, potentially due to lack of access to other sources or for convenience.

The data shows a varied range of sources for obtaining drinking water, with public taps/standpipes being the most common source, followed by hand pumps/boreholes. A small fraction has direct piped connections to their houses, indicating the limited availability of such infrastructure in the

surveyed area. There's also reliance on alternative sources like water vendors or tanker trucks from protected sources, suggesting that some individuals might face challenges in accessing safe and reliable drinking water. Improving access to safe and reliable drinking water sources, especially through piped connections or increasing access to protected sources, could contribute significantly to ensuring clean and accessible drinking water for the population.

Table 30. Sources of Drinking Water

Sources of Drinking Water			
Indicators	**Frequency**	**Percent**	**95% CI value**
Hand pumps/borehole	125	25.77	22.08 – 29.85
Public tap/standpipe	322	66.39	62.07 – 70.45
Piped Connection to house	5	1.03	0.44 – 2.39
Tanker truck from protected source	3	0.62	0.21 – 1.80
Water seller/kiosk	30	6.19	4.37 – 8.69

5.15.3. Water Treatment Methods used in Jacobabad Population

- No treatment: 464 individuals (95.67%) stated that water was not treated.
- Yes, always treated: 12 individuals (2.47%) reported always treating water before consumption.
- Don't Know: 7 individuals (1.44%) were uncertain about whether the water was treated.
- Yes treated sometimes: 2 individuals (0.41%) reported treating water occasionally.

The data suggests that a vast majority of respondents do not treat their water before consumption, indicating potential risks of consuming untreated water.

5.15.4. Sanitation and Hygiene

Adequate Privacy in Toilet Facilities: 292 individuals (60.2%) reported having adequate privacy in their toilet facilities. While a majority reported adequate privacy, a notable percentage might lack proper privacy in their toilet facilities, highlighting potential issues in sanitation and privacy standards.

Open Defecation Practice: 124 individuals (25.6%) indicated open defecation practices. This percentage suggests a significant portion of the population still practices open defecation, which poses health and sanitation risks, emphasizing the need for improved toilet facilities and sanitation practices.

Availability of Soap:

348 individuals (71.75%) reported having soap available. 137 individuals (28.25%) reported not having soap available. While a majority have access to soap, a notable percentage lacks access, which could impact proper hygiene practices, especially hand washing.

Households Unable to Afford Soap: 102 individuals (86.44%) stated that households cannot afford soap. The high percentage reflects financial constraints preventing access to soap,

indicating economic challenges affecting hygiene practices. The data reveals concerning trends such as the majority not treating water before consumption, significant open defecation practices, and challenges in soap availability due to affordability issues.

Table 31 Water, Sanitation and Hygiene (WASH)

	n	%	95% CI
Water Treatment			
Yes Always treated	12	2.47	1.42 -4.27
Don't Know	7	1.44	0.70 – 2.95
No treatment	464	95.67	93.4 – 97.15
Yes treated sometimes	2	0.41	0.11 – 1.49
Household water collection by adult Females	327	67.4	63.05 – 71.58
Adequate privacy in toilet facilities	292	60.2	55.70- 64.59
Open Defecation Practice	124	25.6	21.74 – 29.69
Household water collection by adult Male	136	28.1	24.08- 32.27
Soap available	348	71.75	67.59 – 75.58
Soap not available	137	28.25	24.42 -32.41
Households cannot afford soap	102	86.44	24.42 – 32.41

Latrine availability and open defecation Practices

Types of Latrine Facilities: Household Latrine (287 households, 59.2%): This indicates that a majority of households surveyed have their own private latrine facilities, which are considered beneficial for maintaining privacy and hygiene within the household. Having a household latrine is an essential aspect of proper sanitation.

Communal Latrine: (45 households, 9.32%) and Shared Latrines (23 households, 4.76%) These figures represent households sharing or using communal latrines. Communal or shared latrines are facilities used by multiple households, which might lead to hygiene and privacy concerns due to shared usage.

Open Defecation (124 individuals, 25.67%): Open defecation indicates a lack of access to adequate toilet facilities. It poses significant health risks, contributes to environmental pollution, and can lead to the spread of diseases. The data highlights that a substantial proportion of the surveyed population relies on personal or shared latrine facilities, but a considerable number still resort to open defecation, indicating inadequate access to proper sanitation infrastructure for a significant segment of the community.

Reasons for Open Defecation: Latrine Too Far (4 individuals, 2.0%): This reason indicates that some individuals find latrines distant from their homes, possibly contributing to the challenge of accessing and using proper facilities due to distance.

No Latrine Available (127 individuals, 63.5%): The majority cited the unavailability of latrines as the main reason for open defecation. This points to a critical shortage or absence of proper sanitation facilities in the community.

Too Tired (1 individual, 0.50%) and Too Dark at Night (19 individuals, 9.50%): These reasons, though reported by fewer individuals, highlight additional challenges such as fatigue or safety concerns during nighttime for using available facilities. The primary reason for open defecation is

the absence or lack of available latrines, indicating a significant infrastructure gap. Issues like distance, fatigue, and safety concerns at night contribute to the challenges faced in accessing and using existing facilities.

The data underscores a critical need for improved sanitation infrastructure, especially in terms of increasing access to latrine facilities. The majority of households having their own latrines is positive, but there's still a considerable portion relying on shared or communal facilities and open defecation. The primary reason cited for open defecation is the unavailability of latrines, signifying the urgent need for investment in sanitation infrastructure to ensure proper access to toilet facilities for all community members. Addressing these issues would significantly improve sanitation, hygiene, and overall public health within the surveyed population.

Table 32 Household's Toilet Facilities

	n	%	95% CI
Household latrine	287	59.2	54.98-29.75
Communal latrine	45	9.32	7.04-12.24
Shared latrines	23	4.76	3.19-7.04
Open defecation	124	25.67	21.98-29.75
Reasons for open defecation			
Latrine too far	4	2.0	0.55-5.04
No larine available	127	63.5	56.42-70.18
Too tired	1	0.50	0.01-2.75
Too dark at night	19	9.50	5.82-14.4

5.16. Food Security

5.16.1. Minimum Dietary Diversity -Women

High MDD-W: Frequency: 90 out of 709 women (12.7%) fall into the High Minimum Dietary Diversity category. Women categorized as having high MDD-W consume a wide variety of food groups from various sources. They likely incorporate diverse nutrients into their diet by including different types of fruits, vegetables, proteins, grains, and dairy products, contributing to a balanced and nutritionally rich dietary pattern.

Medium MDD-W: 134 out of 709 women (18.9%) are classified in the Medium Minimum Dietary Diversity category. Women in this group display a moderate level of dietary diversity. They might consume a reasonable variety of food groups but might not have as wide a range as those in the High category. There is room for improvement to further diversify their diet for better nutrition.

Low MDD-W: 485 out of 709 women (68.4%) belong to the Low Minimum Dietary Diversity category.
Interpretation: The majority of surveyed women fall into this group, indicating a lack of diversity in their diet. Women in this category likely consume a limited variety of food groups, potentially lacking essential nutrients from various sources, which could impact their overall nutrition and health.

The data emphasizes that a significant portion of surveyed women have a limited diversity of food intake. A majority fall into the Low MDD-W category, indicating a need for interventions to improve dietary diversity among women. Encouraging the consumption of a broader range of food groups

can enhance their nutritional intake, ensuring they receive a wide spectrum of essential nutrients vital for overall health, especially during pregnancy and lactation.

Community education on dietary diversity and information on locally available and affordable exchanges within the acceptable food groups needs to be imparted both through the health workers and the health care practitioners.

Strategies might include educational programs, nutritional counseling, improving access to diverse food options, and promoting culturally appropriate dietary practices to enhance dietary diversity among women. Enhancing dietary diversity among women is crucial for addressing potential nutritional deficiencies, supporting maternal and child health, and promoting overall well-being among communities.

Table 33. Minimum Dietary Diversity-Women (MDD-W)

S No	MDD-W			
	Indicators	**Frequency**	**Percent**	**CI value 95%**
34	**Minimum Dietary Diversity-Women (MDD-W)**			
a	High	90 (709)	12.7%	(10.33 -15.37)
b	Medium	134 (709)	18.9%	(16.6-21.98)
c	Low	485 (709)	68.4%	(64/84-71.82)

The data provided relates to food insecurity experiences and coping strategies among a surveyed population. Here's an interpretation of the information:

5.16.2. Food Insecurity Experience Scale (FIES):

The Food Insecurity Experience Scale (FIES) measures the extent of food insecurity experienced by individuals or households. It typically assesses the prevalence of different levels of food insecurity based on the responses of surveyed individuals. This scale often categorizes food insecurity into various levels, such as:

None/Light Hunger: This category includes individuals who reported experiencing either no hunger or only mild hunger. In this dataset, 16.1% of individuals (78 out of 485) fall into this category. These individuals face minimal challenges related to obtaining enough food or experiencing hunger.

Moderate Hunger: This category comprises individuals experiencing a moderate level of hunger. Among the surveyed population, 27.4% (133 out of 485) fall into this group. These individuals face a higher level of food insecurity, experiencing moderate challenges in accessing sufficient food.

Severe Hunger: The largest proportion, 56.3% (273 out of 485), falls into this category, indicating a significant prevalence of severe hunger among the surveyed individuals. These individuals face substantial challenges in obtaining enough food, indicating a critical level of food insecurity within this population.

The FIES results reveal a strikingly high prevalence of food insecurity, with a majority of individuals experiencing moderate to severe hunger. This highlights the significant challenges faced by the surveyed population in accessing adequate and nutritious food.

5.16.3. Reduced Coping Strategy Index (rCSI):

High Coping: This group represents individuals who reported employing effective coping strategies to deal with food insecurity. Among the surveyed population, 46.6% (226 out of 485) fall into this category. These individuals likely utilize various strategies to manage food shortages effectively.

Medium Coping: 25.1% (122 out of 485) of individuals fall into this group, suggesting moderate coping strategies in dealing with food insecurity. They might employ some coping mechanisms but might face challenges in effectively managing food shortages.

No or Low Coping: This category includes individuals who reported having inadequate or no strategies to cope with food insecurity. 28.2% (137 out of 485) fall into this group, indicating a significant portion of the surveyed population have resilience to manage food shortages.

The rCSI results indicate that while a substantial portion of the surveyed population employs coping strategies, there's a considerable percentage facing challenges in coping effectively with food insecurity due to the lack of or limited coping mechanisms.

The data portrays a concerning scenario of food insecurity, with a majority experiencing moderate to severe hunger. While a portion of the population demonstrates coping strategies, a significant proportion struggles with inadequate coping mechanisms, suggesting the need for comprehensive interventions to address food insecurity effectively. Addressing these issues will require targeted interventions focusing on improving access to food resources, implementing supportive policies, enhancing coping strategies, and providing assistance to vulnerable populations to ensure better food security outcomes.

Table 34. Food insecurity Scale

S No	FIES			
	Indicators	**Frequency**	**Percent**	**95% CI**
35	**Food Insecurity Experience Scale (FIES)[15]**			
a	None/Light Hunger	78 (485)	16.1%	(12.93-19.66)
b	Moderate Hunger	133 (485)	27.4%	(23.50-31.63)
c	Severe Hunger	273 (485)	56.3%	(51.74-60.76)
36	**Reduced Coping Strategy Index (rCSI)[16]**			
a	High Coping	226 (485)	46.6%	(42.09-51.15)
b	Medium	122 (485)	25.1%	(21.35-29.25)
c	No or Low Coping	137 (485)	28.2%	(24.28-32.48)

[15] 0-1 score: None or light hunger, 2-3 scores,: Moderate hunger, 4-6 scores: Severe hunger
[16] No or low coping (CSI= 0-3), medium (CSI = 4-9, high coping (CSI ≥10).

6. Discussion

The survey findings revealed that Global Acute Malnutrition (GAM) prevalence based on WHZ among children 6-59 months found “Very High” in Jacobabad (24.2%). The overall combined GAM [cGAM] prevalence found 28.7% [24.2 – 33.8 95% C.I.] with a combined SAM (cSAM) rate of 10.3% [7.8 – 13.3 95% C.I.] There was statistically no significant difference found in cGAM and cSAM [P=0.504, 0.659]. The cGAM and cSAM is an aggregated indicator which provides overall acute malnutrition prevalence based on WHZ and/or MUAC and/or Oedema altogether.

Looking at combined prevalence, it is clear that the cGAM and cSAM rates were notably different by WHZ and MUAC which suggests that use of only MUAC or only WHZ based rates might lead to under estimation as well as of caseload when it comes to programming. Therefore, it is recommended to use cGAM estimate from routinely reported population-representative nutrition surveys globally, in addition to WHZ and MUAC, to enable context-specific decision-making, caseload calculation and Joint Response Planning.

The findings show the disparities in access to skilled care during childbirth and varying sources of health information. Addressing these disparities could help improve overall maternal and child health outcomes. The reasons for discontinuing breastfeeding reflect a range of factors, including maternal health, child health, subsequent pregnancies, and child preferences or developmental stages. Some reasons, such as becoming pregnant again or maternal health issues, are external factors impacting breastfeeding continuity. Child illness or refusal to breastfeed and reaching the intended weaning age are internal factors or personal choices influencing breastfeeding cessation. This data focused on the diverse reasons that can lead to the discontinuation of breastfeeding, highlighting the importance of addressing maternal and child health issues and supporting mothers with adequate information and assistance to maintain breastfeeding whenever possible, considering its numerous benefits for maternal and child health.

Gender disparities in water collection responsibilities are evident, with adult females largely responsible, but a portion of households also involving adult males. These findings highlight the need for interventions focused on water treatment, sanitation improvements, gender equality in household responsibilities, and addressing economic barriers to ensure better hygiene practices and public health outcomes within the surveyed population.

The data underscores a critical need for improved sanitation infrastructure, especially in terms of increasing access to latrine facilities. The majority of households having their own latrines is positive, but there's still a considerable portion relying on shared or communal facilities and open defecation. The primary reason cited for open defecation is the unavailability of latrines, signifying the urgent need for investment in sanitation infrastructure to ensure proper access to toilet facilities for all community members. Addressing these issues would significantly improve sanitation, hygiene, and overall public health within the surveyed population.

The data you provided shows the prevalence of different malnutrition indicators in Jacobabad over different periods: NNS 2017-18, MICS 2018-19, and SMART 2023. Global Acute Malnutrition (GAM) according to WHZ: NNS 2017-18: Recorded at 30.5%, MICS 2018-19: Reduced to 14. 6%, and SMART 2023: Increased slightly to 24.2%. There was a significant improvement between NNS 2017-18 and MICS 2018-19, indicating a substantial reduction in acute malnutrition.

However, there's a slight increase in GAM from MICS 2018-19 to SMART 2023, indicating a reversal or stagnation in the progress made between these periods.

The underweight percentage depicted in NNS 2017-18 was40.5%, MICS 2018-19: Increased to 48. while showing slight reduction in SMART 2023 with 33.9% of stunting amongst children <5 years of age.

There was an initial increase in underweight prevalence from NNS 2017-18 while a decrease in underweight prevalence by SMART 2023. However, the underweight rates remain high overall. The prevalence of stunting according to NNS 2017-18 was recorded at 45.8%, MICS 2018-19: Increased to 62. 1%, and reduced to 47.7% in the Smart survey 2023. Stunting initially increased significantly from NNS 2017-18 to MICS 2018-19, indicating a worsening situation. However, there was an improvement by SMART 2023, although it remains high. The data suggests fluctuations and variations in malnutrition indicators over the specified periods in Jacobabad.

There was a marked improvement in some indicators (like GAM and stunting) between MICS 2018-19 and SMART 2023 after initial deteriorations. However, the rates remain high overall. Underweight rates showed fluctuations with an increase from NNS 2017-18 to MICS 2018-19 but a subsequent decrease by SMART 2023. The prevalence rates of all indicators are relatively high, signifying the persistent challenge of malnutrition in Jacobabad despite some improvements. It's crucial to continue monitoring and implementing targeted interventions focusing on nutrition, health, sanitation, and access to adequate food to sustainably reduce malnutrition rates in the region.

Addressing malnutrition comprehensively requires sustained efforts, including improved healthcare, sanitation, education, access to nutritious food, and community-based interventions to ensure better health outcomes for the population of Jacobabad.

Jacobabad			
Indicators	**NNS 2017-18**	**MICS-2018-19**	**SMART 2023**
Global Acute Malnutrition	30.5%	14.6%	24.2%
Underweight	40.5%	48.3%	33.9%
Stunting	45.8%	62.1%	47.7%

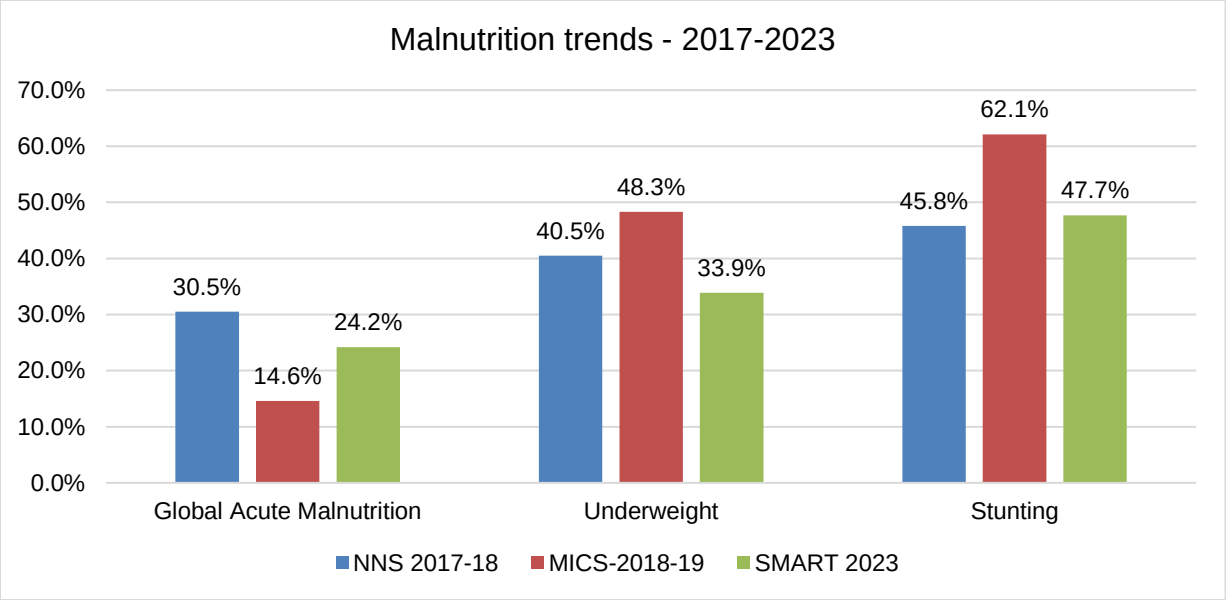

Figure 7: Malnutrition trends

Main Contributing factors of high malnutrition and Food insecurity

The district of Jacobabad has faced a series of challenges over the past five years, encompassing elevated inflation linked to the nation's internal economic struggles, recurring droughts with insufficient rainfall and heat waves, heavy monsoon rains leading to flooding, and outbreaks of livestock diseases resulting in significant deaths. Consequently, the current period has witnessed adverse outcomes for food security in the region.

Looking ahead, the situation is anticipated to worsen further due to the devastating aftermath of one of the most severe monsoon floods in 2022. This calamity has inflicted extensive damage on agricultural infrastructure, resulted in substantial livestock losses, and had a detrimental impact on overall food production, as well as the availability of food and livelihood opportunities. Accessing food is poised to become increasingly challenging, given the persistent rise in food commodity prices. Moreover, the post-flooding scenario is expected to contribute to a reduction in livelihood opportunities, exacerbating food insecurity in the area.

7. Recommendations

Based on the findings of the SMART Nutrition Survey in Jacobabad, Sindh in 2023, the following recommendations and action plan are proposed for policy makers to address the identified issues:

Indicators	Areas	Actions
Malnutrition and Nutritional Status of Children	Targeted Nutrition Programs	Develop and implement targeted nutrition programs focusing on reducing wasting, stunting, and underweight among children aged 6-59 months. These programs should include strategies for improving dietary diversity, promoting breastfeeding practices, enhancing access to nutritious food Investment in IFA/Micronutrient supplementation and ensure compliance through family members/influencers
	Collaboration Mechanism	Engagement of education authorities to promote adolescent nutrition at public and private sector institutes via panel discussions and seminars. Promote Family MUAC and collaboration with outreach team, community leaders, and NGOs is essential for effective implementation.
	Integrated Healthcare Services	Improve access to healthcare facilities, mobile health unit campaign, especially in rural or underserved areas, to ensure timely diagnosis and treatment of malnutrition and health challenges. Family planning integration in the IEC materials to promote and provide cost free services Vaccination drive and mass campaign regularly to identify zero doses, mapping of uncovered areas through additional resources.
	Community Education and Outreach	Launch community-based educational campaigns to raise awareness about proper nutrition, hygiene, and sanitation practices. Empower caregivers with knowledge about balanced diets, the importance of breastfeeding, proper infant and child feeding practices, and hygiene measures to prevent illnesses that contribute to malnutrition. Utilize local community leaders and influencers to disseminate information effectively.
	Focus on Preventive Healthcare	Emphasize preventive healthcare interventions by providing access to clean water, sanitation facilities, and hygiene education. Improving access to clean water sources and sanitation facilities can reduce the risk of waterborne diseases, ultimately preventing illnesses that contribute to malnutrition-related mortality

	Strengthen Antenatal Care Services	Despite good coverage of iron/folic acid supplementation, efforts are needed to enhance family planning knowledge and ensure continuous support from family members during pregnancy and lactation. Strengthen outreach programs to raise awareness about family planning options, encourage familial support, and educate on the importance of skilled delivery attendants to increase hospital deliveries.
	Improve Access to Healthcare Facilities	Address the geographical barriers by improving access to healthcare facilities within a 5 km radius. Implement strategies to reduce travel distances, possibly by establishing additional health facilities or mobile clinics, ensuring timely access to maternal and child healthcare services.
	Increase in IFA Tablet Consumption	Despite a majority consuming IFA tablets, a significant portion either does not consume them or consumes them partially. Implement targeted educational campaigns emphasizing the importance of consistent IFA tablet intake during pregnancy to address nutritional deficiencies.
Child Health	Enhance Child Health Interventions	Strengthen deworming campaigns to increase coverage among children aged 12-59 months. Improve documentation and awareness around measles vaccination to bridge the gap between card-based records and recall. Encourage broader coverage of Vitamin-A supplementation among children aged 6-59 months
	Diarrhea Management	Efforts should focus on increasing access to Zinc or ORS treatment for diarrhea among children to further reduce morbidity and mortality associated with diarrheal episodes.
Food Security and Livelihood	Enhance Food Security Programs	Develop and implement targeted food security initiatives focusing on the most affected populations experiencing severe hunger. These programs should aim to increase access to nutritious food through subsidized food distribution, food banks, or community gardens, especially in areas with high reported food insecurity.
	Nutrition Education and Support Program	Establish community nutrition programs that provide practical training and support for women to diversify their diets, emphasizing the importance of consuming a variety of nutrient-rich foods for overall health.
	Support Income Generation and	Develop and strengthen programs that provide economic support, vocational training, and income-generating activities to vulnerable communities. Empowering individuals to earn a

	Livelihood Opportunities	sustainable income can mitigate food insecurity by enhancing their purchasing power for food and other essential needs
	Strengthen Safety Nets and Social Support	Expand social safety net programs such as food assistance programs, cash transfers, or food vouchers targeted at households facing severe food insecurity. Strengthen community-based support systems to provide aid to those struggling to cope with food insecurity.
		Design programs that help communities build resilience against food insecurity by promoting income-generating activities, livelihood diversification, and skills training to create alternative sources of income and reduce dependency on a single livelihood
	Monitoring and Evaluation	Establish a robust monitoring and evaluation system to track the effectiveness and impact of food security programs regularly. Continuous assessment and feedback mechanisms will help in refining strategies and addressing evolving challenges effectively. Nutrition Coverage Assessment to identify the barriers in the current programs and propose redesign.
Water, Sanitation, and Hygiene (WASH)	Enhancing Water Access and Infrastructure	Rehabilitation of the water schemes at household's level and promote the use of water reservation techniques. Initiatives should aim to reduce this gender gap, possibly by introducing community water supply schemes that minimize the need for individual household collection. Target interventions toward the primary reasons for open defecation such as the absence of latrines, lack of lighting at night, and distance from latrines. This may involve infrastructure development for better lighting, constructing latrines, and providing support for households to build their own sanitation facilities.
	Improving Sanitation and Hygiene	Provision of low cost latrines to vulnerable households Policy interventions should prioritize providing access to proper sanitation facilities and promoting behavior change through awareness campaigns, aiming to eliminate open defecation.
	Improving Water Quality and Treatment	There is a critical need for education campaigns and infrastructure development to promote water treatment practices. Implement programs that educate communities about water treatment methods and support the installation of water treatment facilities in households or communities.

	Soap Availability and Hygiene Promotion	Ensure consistent availability of soap in households by implementing measures to address the reported lack of soap. Launch hygiene education campaigns emphasizing proper hand washing practices to prevent diseases. Collaborate with local authorities, Schools, Teachers committee and NGOs to distribute soap and educate communities about its importance in maintaining hygiene and preventing illnesses.

8. Annexures

8.1. Annex I: Sphere Standards CDR and U5DR Emergency Threshold Cut-offs by Region

Region	CDR Baseline	CDR Emergency Threshold	U5DR Baseline	U5DR Emergency Threshold
South Asia	0.22	0.40	0.46	0.90
East Asia and Pacific	0.19	0.40	0.15	0.30
Industrialised Countries	0.25	0.50	0.03	0.10
Developing Countries	0.22	0.40	0.44	0.90
Least developed countries	0.33	0.70	0.82	1.70
World	0.25	0.50	0.40	0.80

8.2. Plausibility Report-

Standard/Reference used for z-score calculation: WHO standards 2006

(If it is not mentioned, flagged data is included in the evaluation. Some parts of this plausibility report are more for advanced users and can be skipped for a standard evaluation)

Overall data quality

Criteria	Flags*	Unit	Excel.	Good	Accept	Problematic	**Score**
Flagged data	Incl	%	0-2.5	>2.5-5.0	>5.0-7.5	>7.5	
(% of out of range subjects)			0	5	10	20	**0** (1.5 %)
Overall Sex ratio	Incl	p	>0.1	>0.05	>0.001	<=0.001	
(Significant chi square)			0	2	4	10	**0** (p=0.151)
Age ratio(6-29 vs 30-59)	Incl	p	>0.1	>0.05	>0.001	<=0.001	
(Significant chi square)			0	2	4	10	**2** (p=0.090)
Dig pref score - weight	Incl	#	0-7	8-12	13-20	> 20	
			0	2	4	10	**0** (3)
Dig pref score - height	Incl	#	0-7	8-12	13-20	> 20	
			0	2	4	10	**2** (12)
Dig pref score - MUAC	Incl	#	0-7	8-12	13-20	> 20	
			0	2	4	10	**0** (7)
Standard Dev WHZ	Excl	SD	<1.1	<1.15	<1.20	>=1.20	
.			and	and	and	or	
.	Excl	SD	>0.9	>0.85	>0.80	<=0.80	
			0	5	10	20	**0** (1.09)
Skewness WHZ	Excl	#	<±0.2	<±0.4	<±0.6	>=±0.6	
			0	1	3	5	**1** (-0.25)
Kurtosis WHZ	Excl	#	<±0.2	<±0.4	<±0.6	>=±0.6	
			0	1	3	5	**1** (-0.22)
Poisson dist WHZ-2	Excl	p	>0.05	>0.01	>0.001	<=0.001	
			0	1	3	5	**1** (p=0.031)
OVERALL SCORE WHZ =			0-9	10-14	15-24	>25	**7** %

The overall score of this survey is 7 %, this is excellent.

8.3. Annex –III Event Calendar

	EVENT CALENDAR 2018 TO 2023 (SINDH)											
Month	2018		2019		2020		2021		2022		2023	
Jan			1 Jan New Year's Day Wheat sowing Season (Dec-Jan)	55	1 Jan New Year's Day 29 Jan Basant Panchami Wheat sowing Season (Dec-Jan)	43	1 Jan New Year's Day 06 january- 01 Jamad ul sani Wheat sowing Season (Dec-Jan)	31	1 Jan New Year's Day 06 january- 01 Jamad ul sani Wheat sowing Season (Dec-Jan)	19	1 Jan New Year's Day 26 Jan Basant Panchami Wheat sowing Season (Dec-Jan)	7
Feb			5 Feb Kashmir Day 10 Feb Basant Panchami Lady finger (Jan-Mar) Dera Jaat Water melon (Feb-July) Apple (Feb-July)	54	5 Feb Kashmir Day Nokeen Saal Lady finger (Jan-Mar) Water melon (Feb-July) Apple (Feb-July) 21 feb shivratri	42	5 Feb Kashmir Day 16 Feb Basant Panchami 14 Feb-1st Rajab Lady finger (Jan-Mar)	30	5 Feb Kashmir Day 01 rajab Lady finger (Jan-Mar) Water melon (Feb-July) Apple (Feb-July)	18	5 Feb Kashmir Day 01 shaban 15 Feb- Bargah Dera jat kunday	6
Mar			4 Mar Shivaratri 21 Mar Holi 23 Mar Pakistan Day 21 march Dulhandi Bilot Mela Rabi Corp Harvesting	53	10 Mar Holi 10 march Dulhandi 23 Mar Pakistan Day 23 Mar Shab e-Meraj Rabi Corp Harvesting 10 march dulhandi	41	11 march shivratri 29 Mar Holi 12 March Shab e-Meraj 15 March- 01 Shaban 23 Mar Pakistan Day 29 march dulhandi Rabi Corp Harvesting	29	18 Mar Holi 23 Mar Pakistan Day 01 MArch Shab e-Meraj 29 march ramzan 23 Mar Shab e-Meraj Rabi Corp Harvesting	17	23 Mar Pakistan Day 08 Mar Holi Rabi Corp Harvesting	5
Apr			Sikandar Mela 3 Apr Shab e-Meraj 21 April Ridvan 19 Apr Good Friday 20 Apr Shab e-Barat Rabi Corp Harvesting	52	12 Apr Easter Monday 13 april besakhi Sikandar Mela 09 Apr Shab-e-Barat 30 Apr Buddha Purnima Rabi Corp Harvesting	40	04 Apr Easter Monday 14 Apr 1st ramzan Sikandar Mela Rabi Corp Harvesting Bargah	28	01 shawal Eid ul fitar (holi) 30 April 1st shawal Rabi Corp Harvesting Sikandar Mela	16	09 Apr Easter Monday 01 ramzan Sikandar Mela Rabi Corp Harvesting	4
May			1 May Labour Day 18 May Buddha Purnima 6 may Ramadan start	51	1 May Labour Day 16 may Ramadan start Budha punima 22 May 23-24 May Eid-ul-fitr	39	1 May Labour Day 19 May Buddha Purnima 12-13 May Eid-Ul-Fitr (Holi) 14 May- 1st Shawal	27	1 May Labour Day 28 may - 01 zilqad 01-02 May Eid-Ul-Fitr	15	01 shawal eidul fitar Urs Mela	3
June			5 Jun Eid-ul-Fitr 6 Jun Eid-ul-Fitr Holiday 7 Jun Eid-ul-Fitr Holiday Summer vacation	50	-	38	12 June- 1st Zilqad	26	29 june 1st zilqad	14	01 Zilhajj Heavy rainfall Storm 27 june football tournament 29 june Eid ul azha	2
July			1 Jul 1 Bank Holiday Monsoon Heavy Rain	49	1 July 1 Bank Holiday Monsoon Heavy Rain 31 Jul Eid al-Adha	37	1 Jul 1 Bank Holiday Monsoon Heavy Rain 12 july -1st Zilhajj 21 July Eid Ul Azha	25	28 july 1st Moharram 1st week of July heavy rain 10 Jul Eid al-Adha Lumpy Skin Disease animal	13	28 july 10 Moharram Lumpy Skin Disease animal	1

August	14 Aug Independence Day 18 Aug Imran Khan Selected 22 Aug Eid al-Adha 23 Aug Eid al-Adha Holiday 24 Aug Eid al-Adha Holiday Monsoon Heavy Rain 28 Aug- Akbar Bugti death anniversary	60	12 Aug Independence Day 13 Aug Eid al-Adha Holiday 15 August Hob 14 Aug Eid al-Adha Day 4 15 August Mischin 24 Aug Janmashtami Monsoon Heavy Rain 28 Aug- Akbar Bugti death anniversary	48	1 Aug Eid al-Adha Holiday 2 Aug Eid al-Adha Holiday 11 Aug Jamnashtmi 14 Aug Independence Day 15 August Mischin 15 August Hob 29 Aug Ashura 30 Aug Ashura Holiday Monsoon Heavy Rain	36	14 Aug Independence Day 18 Aug Ashoora 15 August Mischin 15 August Hob 10 Aug- 1st Moharram Monsoon Heavy Rain	24	14 Aug Independence Day 27 august 1st safar 08 Aug Ashura 25 Aug flood 27 August- 1st Moharram 09 Aug Ashura Holiday Monsoon Heavy Rain 23 safar meethitikiyan (Tikray)	12	14 Aug Independence Day 27 august 1st safar 08 Aug Ashura 25 Aug flood 27 August- 1st Moharram 09 Aug Ashura Holiday Monsoon Heavy Rain 23 August Jammashtmi	0
Sept	3 Sep Janmashtami Sep 23 Pashtun cultural day 6 Sep Defence Day 21 Sep Ashura Sep 7 Khatam-e-Nobuwwat day 22 Sep Ashura Holiday	59	6 Sep Defence Day 9 Sep Ashura Sep 23 Pashtun cultural day 10 Sep Ashura Holiday Sep 7 Khatam-e-Nobuwwat day	47	6 Sep Defence Day Sep 23 Pashtun cultural day Sep 7 Khatam-e-Nobuwwat day	35	6 Sep Defence Day 28 Sep Chelum 09 Sep- 1st Safar Sep 23 Pashtun cultural day Sep 7 Khatam-e-Nobuwwat day	23	6 Sep Defence Day 25 sep 1st rabi-ul-awal 17 Sep Chelum Sep 23 Pashtun cultural day Sep 7 Khatam-e-Nobuwwat day	11		
Oct	17 Oct Durga Puja 19 Oct Dussehra 30 Oct Chelum Ghala Kishar 24 Oct Lateef Bhitai Urs	58	20 Oct Chelum 27 Oct Diwali/Deepavali 8 Oct Dussehra 13 Oct Lateef Bhitai Urs	46	8 Oct Chelum 23 Oct durga pooja 25 Oct Dussehra 30 Oct Eid Milad un-Nabi kharif Harvest season 1-3 Oct Lateef Bhitai Urs	34	20 Oct Birthday of Guru Ghala Kishar 27 Oct Diwali/Deepavali kharif Harvest season	22	3 oct durga pooja 5 oct dussehri 30 Oct Eid Milad un-Nabi 20 Oct rabi ul sani kharif Harvest season Ghala Kishar	10		
Nov	7 Nov Diwali/Deepavali 9 Nov Iqbal Day 21 Nov Eid Milad un-Nabi 23 Nov Guru Nanak's Birthday	57	9 Nov Iqbal Day 10 Nov Eid Milad un-Nabi 12 Nov Guru Nanak's Birthday	45	9 Nov Iqbal Day 14 Nov Diwali/Deepavali 28 Nov Giarhwin Sharief 30 Nov Guru Nanak's Birthday	33	9 Nov Iqbal Day 10 Nov Eid Milad un-Nabi 7 N0v- !st Rabiul sani	21	9 Nov Iqbal Day 14 Nov Diwali/Deepavali 26 Nov 1st Jamadi ul awal Rabi ul sani	9		
Dec	19 Dec Giarhwin Sharief 25 Dec Quaid-e-Azam Day Pakhtun Culture Day 31 Dec New Year's Eve 22 Dec Benazeer death Anniversary	56	19 Dec Giarhwin Sharief 25 Dec Quaid-e-Azam Day Pakhtun Culture Day 31 Dec New Year's Eve 22 Dec Benazeer death Anniversary Winter vacation	44	19 Dec Giarhwin Sharief 25 Dec Quaid-e-Azam Day Pakhtun Culture Day 31 Dec New Year's Eve 22 Dec Benazeer death Anniversary winter vacation	32	19 Dec Giarhwin Sharief 25 Dec Quaid-e-Azam Day Pakhtun Culture Day 31 Dec New Year's Eve 22 Dec Benazeer death Anniversary winter vacation	20	19 Dec Giarhwin Sharief 25 Dec Quaid-e-Azam Day Pakhtun Culture Day 31 Dec New Year's Eve 22 Dec Benazeer death Anniversary winter vacation Rabi ul Awal	8		

8.4. Annex IV Cluster control Form

Line list HH #	Order of Visit	Name of HH	First Visit Outcome 1 = completed 2 = partly completed 3 = refused 4 = absent*	Number of eligible children (6-59 months)	Number of eligible children Measured (6-59 months)	Number of children under 2 (0-23 months)	HH needs to be revisited Yes or No	HH Re-visited Yes or No	Second Visit Outcome (If necessary) 1 = completed 2 = part completed 3 = refused 4 = absent	Comments
	1									
	2									
	3									
	4									
	5									
	6									
	7									
	8									
