FY 2024-2025

**Study in the
West Khasi Hills District of Meghalaya**

Assessment of Health Hygiene and Sanitation Status of the Khasi in North East India, with Special Reference to Women and Children

**ANTHROPOLOGICAL SURVEY OF INDIA
NORTH EAST REGIONAL CENTRE
MINISTRY OF CULTURE
GOVERNMENT OF INDIA**

Regional Project

On

Assessment of Health Hygiene and Sanitation Status of the Khasi in North East India, with Special Reference to Women and Children

Anthropological Survey of India
North East Regional Centre
Shillong

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RESEARCH TEAM

Research Advisor

Prof. Arup Ratan Bandyopadhyay

Principal Investigators

Mr. Subhra Sankha Barik, Superintendent Anthropologist (Physical)
Dr. Koel Mukherjee, Anthropologist (Physical)

Other Research Personnel

Dr. (Smt) Deimaphishisha Sun, Asst. Anthropologist (P)
Mr. WanpliSynnah, Research Associate (Folklore)
Mr. Shubham Roy, Research Associate (P)
Ms. Dipashna Banerjee, SRF
Ms. InotoliAssumi, SRF
Ms. Shreyasi Podder, JRF

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The Team

Introduction:

A healthy mother and a healthy baby serve as a "vital index of a healthy society" underscores a fundamental truth about societal well-being. Pregnancy and childbirth bring moments of great hope and pleasant anticipation in women's lives and their families (Nagral, 1997). However, this period is also one of significant vulnerability for both the woman and her child. Ensuring positive outcomes requires a supportive environment encompassing access to quality healthcare, adequate nutrition, social support, and a safe environment. The health of mothers and newborns is not merely a matter of individual concern; it reflects the overall health, development, and equity of a community and a nation. Globally, 1.5 billion women were estimated to be of childbearing age (15 to 45 years) in 2011 out of which 26 percent (310.62 million) were from India alone (WHO, 2023). This vast population of women in their reproductive years highlights the critical importance of focusing on maternal and child health initiatives in India. The health and well-being of this significant demography have profound implications for the nation's demographic trends, public health infrastructure, and socio-economic development.

Maternal and infant mortalities pose substantial challenges to global public health. The fact that the global Maternal Mortality Ratio (MMR) stood at an estimated 223 maternal deaths per 100,000 live births in 2020 (World Health Organization, 2023) highlights that approximately 800 women died every day from preventable causes related to pregnancy and childbirth (Downtoearth.org, 2025). This unexpectedly high burden signifies a significant failure in healthcare systems worldwide, particularly in ensuring access to essential maternal care. Research indicates that the primary causes of these deaths globally include severe bleeding (hemorrhage), hypertensive disorders (like pre-eclampsia and eclampsia), infections, complications from unsafe abortions, and pre-existing medical conditions aggravated by pregnancy (WHO, 2023; Chavan et al. 2016).Central and Southern Asia is one of the biggest contributors to global maternal mortality with an MMR of approximately 129 (WHO, 2023).This indicates that women in this region face a disproportionately higher risk of dying during pregnancy and childbirth compared to many other parts of the world. Factors contributing to this include socioeconomic conditions, access to and quality of healthcare services, cultural practices, and nutritional status (Care Health Insurance, 2023; Data for India, 2024). In 2020, India recorded the second-highest number of global maternal deaths, with approximately 24,000 fatalities, ranking just below Nigeria (WHO, 2023). While India has made significant progress in reducing its MMR over the past decades (from 384 in 2000 to 103 in 2020, according to PIB, 2024), the sheer volume of births annually still results in a large number of maternal deaths. This high number necessitates a deeper understanding of the underlying causes and persistent challenges within the Indian context.

Similarly, India also has one of the highest global Infant Mortality Ratios (IMR) standing at 40.7 deaths per 1000 live births (Ministry of Tribal Affairs, 2023). Macrotrends estimates India's IMR for 2023 to be around 26.619 deaths per 1000 live births, showing a declining trend over the years. However, even with this decline, it still signifies a considerable number of preventable infant deaths. The figure of 40.7 from the Ministry of Tribal Affairs (2023) likely reflects data from a specific survey or a slightly earlier period and might be focusing on tribal populations, who often experience higher rates of infant mortality. While India has made progress in reducing infant mortality, the reported IMR of 40.7 (or even the lower estimates around 26) indicates that significant challenges persist. Addressing the complex interplay of medical, socioeconomic, and environmental factors through continued and intensified government efforts, coupled with community participation and awareness, is crucial to ensuring a healthier start for every child in India and achieving global targets for child survival.

Maternal and child health and nutrition (MCHN) indicators reflect a country's ability to meet the Sustainable Development Goal 1. While many LMICs (Lower- and Middle-Income Countries) are struggling in achieving SDG and MCHN related targets, relatively few countries have been able to do so over the years. Although many low-and middle-income countries (LMICs) are struggling to achieve the sustainable development goals (SDG) targets, India stands as a unique nation which has consistently improved maternal and child health and nutrition (MCHN). However, maternal and infant mortality poses substantial challenges to global public health despite the effort. Acute morbidities affect over 50 million pregnancies and deliveries each year. Poor health care practices during pregnancy, childbirth and after delivery are responsible factors for maternal and infant morbidity and mortality. The leading causes of deaths and deformity for women of reproductive age in developing countries are found to be due to obstetric complications which are the world's most urgent and intractable health problems (Singh. S *et.al.,* 2004).

In India tribal communities bear a significant burden with over 50% of all maternal deaths and IMR in the country (Madankar*et. al.,* 2024). The IMR among tribal children is 30% higher than the national average and 61% higher for tribal children under five (Madankar*et. al*., 2024). The higher IMR and MMR observed in tribal populations according to Madankar*et. al*., (2024) is due to disparities in social determinants of health such as education, adequate and trained healthcare workforce, access to care, and health financing. Inadequate healthcare infrastructure, limited access to essential services, malnutrition, and high disease prevalence, hinder overall health and well-being of tribal populations in India (Hamal *et. al*., 2020). With low socioeconomic status, and remote rural area adds to disease burden posing a challenge for maternal and child health care among tribal populations. This includes communicable and non-communicable diseases, malnutrition, mental health issues, and addictions which are all related to inadequate health care and healthcare infrastructure (Kumar *et. al*., 2020). To illustrate, maternal and child healthcare services are mostly underutilized amongst tribal women, with only 10% of tribal women receiving full antenatal care and only 18% of tribal women having institutional deliveries

(Madankar*et al*., 2024). Tribal children were found to have a full vaccination rate of only 55.8%, whereas the national average stood at 62.0% (Ministry of Tribal Affairs, 2019). The elevated IMR in tribal communities can be partially attributed to the lower vaccination rates. The presence of unfavorable social indicators in tribal populations is the result of long-standing discrimination and an infringement of rights of tribal communities. Additionally, social and geographic isolation restrain maternal and infant health in tribal communities (Hamal *et. al*., 2020). Furthermore, almost 90% of tribal people reside in rural areas (The Expert Committee on Tribal Health, 2023). Rural areas in India are characterized by numerous healthcare challenges, including limited access to quality healthcare facilities, subpar quality of primary health care, and ineffective training of rural healthcare professionals (Mohan & Kumar, 2019; Sabri *et. al*., 2023). It is found that mortality and morbidity data are essential in understanding the health status of populations, evaluating healthcare interventions effectiveness, and identifying areas requiring attention in public health strategies. Therefore, the purpose of this qualitative study is to identify morbidity and mortality of the community with special reference to the health of women and children, community involvement in health care, community and personal hygiene along with anthropometric measurement of mother and child. With persistence of child and maternal malnutrition in North East India, notably in Meghalaya despite the Government efforts this project aims to measure nutritional status, hygiene, and sanitation among women and children in the State of Meghalaya. The goal is to develop a comprehensive model tailored to intervene the problems while understanding the factors such as social-cultural and geographical barriers, and diverse ethnic groups as these factors play a crucial role in shaping maternal and child health.

Globally, one in three children under the age of five experiences undernutrition, manifested as stunting (low height-for-age), wasting (low weight-for-height), or underweight (low weight-for-age); in some cases, overweight and obesity are also observed (Permatasari and Chadirin 2022). According to a recent report by the United Nations Children's Fund (UNICEF), approximately 22.3% (148.1 million) of under-five children were stunted, 6.8% (45 million) were wasted, and 5.6% (37 million) were overweight (Krishna and Srijayanth 2022; UNICEF 2023). Additionally, it was reported that around 462 million children globally were underweight (Krishna and Srijayanth 2022; UNICEF 2023). India, in particular, continues to report some of the highest rates of childhood malnutrition worldwide (Krishna and Srijayanth 2022; Biswas and Khatun 2023). Reflecting this burden, India ranked 111th out of 125 countries in the Global Hunger Index 2023, slipping from 107th place in 2022. The Global Hunger Index assesses countries based on four key indicators: undernourishment, child wasting, child stunting, and child mortality. The Indian Health of Nation's State report (2017) highlighted that in the North-East State of India, the malnutrition is more severe in comparison to the national average (Suri, 2023), particularly Assam and Meghalaya, which are still considered at the lowest level of epidemiological transition. Meghalaya has the highest stunting at 47%, followed by Nagaland at 32.7%, Tripura at 32.3%, and Mizoram at 28.9% (Suri, 2023). The widespread occurrence of

under nutrition poses a significant public health challenge for children in most of the developing nations. The recent National Family Health Survey-5 (2019-21) data revealed the prevalence of stunting, wasting and underweight for under-five children in India are 35.5%, 19.3% and 32.1%, respectively (International Institute for Population Sciences, 2021). This signifies a very alarming condition as the frequency of stunting and wasting in under-five Indian children was much higher when compared with global data. Nutritional status for the state of Meghalaya, revealed high rates of childhood undernutrition with 31% underweight, 42% stunting, 17% wasting, and 71% of children under 5 with anaemia (District Level Health Survey of the International Institute for Population Sciences, 2014). A study conducted in 2022 (Sample Registration System Bulletin of Registrar General of India, 2022) showed that Assam has the highest infant mortality rate (IMR) followed by Meghalaya and Arunachal Pradesh, which is the cause of significant concern. Mizoram has shown comparatively better performance with regard to child mortality rate and health.

Another major public health concern in India is childhood anaemia, which significantly contributes to increased morbidity and mortality risks among young children. According to data from the National Family Health Survey (NFHS), the burden of anaemia among children in the North Eastern region of India is alarming. Approximately 52.5% of children in this region are anaemic, with 1.9% classified as severely anaemic, 24.7% as moderately anaemic, and 25.9% as mildly anaemic. Among the north-eastern states, Tripura reported the highest prevalence of childhood anaemia at 74.2%, followed by Assam at 61.8%. Interestingly, anaemia trends among women aged 15-49 years vary across the region. From 2015 to 2022, Arunachal Pradesh showed a noteworthy decline in the prevalence of anaemia among women, suggesting the potential effectiveness of state-specific health interventions and improved awareness regarding women's nutrition. In contrast, Meghalaya experienced a slight increase in anaemia among women during the same period—from 27.9% (NFHS-4, 2015-16) to 28.9% (NFHS-5, 2019-21)—indicating regional disparities that may stem from differences in healthcare access, dietary practices, and programmatic outreach. Addressing childhood anaemia and related nutritional challenges requires a multidimensional and culturally responsive approach. It is essential to develop targeted interventions that are sensitive to ethnic diversity, cultural practices, and the socio-economic and geographical specificities of different communities. In tribal and marginalized populations, for instance, food choices and healthcare-seeking behaviour are often shaped by traditional beliefs, livelihood patterns, and environmental limitations. Therefore, nutrition strategies must not only focus on micronutrient supplementation or food distribution, but also promote maternal education, community-based awareness, and behavioural change communication, particularly around maternal nutrition and its direct influence on child health outcomes. Ensuring local participation in program design and leveraging community health workers familiar with local customs can further enhance the effectiveness and sustainability of interventions.

Additionally, sanitation and hygiene constitute fundamental components of public health strategies, as they are crucial for preventing communicable diseases, reducing child mortality, and enhancing overall quality of life. The availability of clean water, proper waste disposal systems, and access to functional toilets are directly linked to the health and dignity of individuals and communities. Despite their acknowledged importance, India has historically struggled with the provision of adequate hygienic facilities, particularly in rural and marginalized regions. These challenges are deeply rooted in a complex interplay of infrastructural limitations, socio-economic disparities, behavioural practices, and policy implementation gaps. In the context of North East India, sanitation and hygiene concerns are further shaped by a unique set of geographical, cultural, and developmental factors. The region's difficult terrain, dispersed settlements, and frequent monsoonal disruptions often impede infrastructure development and service delivery. Additionally, traditional beliefs and taboos surrounding sanitation practices in some tribal and ethnic communities can pose barriers to behavioural change. While many households may have access to latrines due to government schemes like the Swachh Bharat Mission, actual usage and maintenance remain inconsistent due to lack of awareness or community participation. Efforts have indeed been made by both governmental and non-governmental bodies to improve sanitation and hygiene in the region. Initiatives focusing on toilet construction, menstrual hygiene education, and clean drinking water supply have gained momentum in recent years. However, these interventions often encounter persistent challenges such as inadequate monitoring, limited funding, logistical difficulties in remote areas, and a shortage of trained personnel for hygiene education and advocacy. Furthermore, without addressing the broader social determinants of health—including poverty, gender inequality, and educational gaps—sanitation programs may fall short of achieving long-term impact. Therefore, improving public health and well-being through sanitation and hygiene requires a holistic and context-sensitive approach. This includes integrating infrastructural development with sustained community engagement, culturally appropriate education campaigns, and robust local governance. In regions like North East India, where diversity and isolation often intersect, tailor-made strategies that account for local needs and practices are vital for building resilient and health-affirming environments.

To the best of current knowledge, there exists a significant scarcity of comprehensive data concerning the health, hygiene, and sanitation status of tribal communities in North East India. While national-level surveys and health reports provide broad overviews, they often fail to capture the nuanced realities of these indigenous populations, particularly when it comes to disaggregated data specific to ethnicity, geography, and socio-cultural contexts. More importantly, there is a notable lack of integrated or triangulated analyses that examine the interrelationship between health outcomes and other influencing variables such as socio-economic status, environmental conditions, education levels, and access to public services. This gap is especially critical in a region as diverse and ecologically sensitive as the North East,

where community-specific challenges and structural inequities can significantly affect health behaviours and outcomes.

Recognizing this data gap, the present study has made a concerted effort to bridge the disconnect between available secondary information and the ground-level realities faced by tribal populations of North east India. By adopting a holistic and interdisciplinary approach, the study attempts to triangulate health data with relevant socio-economic, cultural, and environmental factors, thereby providing a more grounded and context-sensitive understanding of health and sanitation issues. This approach not only enhances the accuracy of the findings but also contributes valuable insights for policy formulation, program design, and targeted interventions aimed at improving public health outcomes among these often-overlooked communities. Against this backdrop, the primary objectives of the study are as follows:

1. Undertake a survey of the morbidity and mortality of the community with special reference to the health of women and children.

2. Assess the anthropometric parameters of the children and mothers of the Khasi community.

3. Undertake the existing facilities and practices for community and personal hygiene to know the role of cultural, social, economic and other factors in the hygiene behaviour of Khasi women and children.

4. Identify the extent of community involvement in the health care and also the factors that promote and inhibit community involvement.

Materials and Methods:

The present study isa part of the regional project of Anthropological Survey of India, North East Regional Centre entitled "**Assessment of Health Hygiene and Sanitation Status of the Khasi in North East India, with Special Reference to Women and Children**".

The study was conducted among the mothers of age group 15 - 49 years and children of the age group 0-5 years respectively. During the present fieldwork, total 351 mothers, 172and 136 motherswere studied from Nongstoin andRi-Muliang block respectively and total 347 children, 150 from Nongstoin block and 197 from Ri-Muliang block were studied.

Area of Study

Two blocks, Nongstoin and Ri-Muliang of West Khasi Hills district was taken as the area of study during the survey based on their proximity to the district headquarter. Block Nongstoin is nearer to the district headquarter with 25.52° North (latitude) and 91.27° East (longitude) whereas, block Ri-Muliang is farther from the district headquarter between 25.1° North and 26.7° North (latitude) and 89.50° East 92.48° East (longitude).

Altogether 346 households, 188 households from Nongstoin block where 4 Gram Sevak Cirle including 15 villages was studied and 158 households from Ri-Muliang block where 2 Gram Sevak Circle including 7 villages was studied respectively. The survey was systematically conducted with the help of structured and pre - tested scheduletocomprehensively understand the health status of women and children in terms of mortality, morbidity and nutritional status by examining the relationship between the socio-cultural and geographical factors. Fieldwork was from November to December, 2024.

Map of India depicting Meghalaya

Map of Meghalaya showing Nongstoin and Ri-Muliang block

N

Map no to Scale

India

West Khasi Hills district showing Nongstoin and Ri – Muliang blocks

Studied Population

The present cross-sectional study was conducted among the Khasi tribal community of West Khasi Hills Districts of Meghalaya. The Khasi is the largest group followed by the Garo and then the Jaintia in Meghalaya. The Garo tribe have their homeland in western Meghalaya, the Khasi is distributed in central Meghalaya, while the Jaintia is mainly distributed in eastern and south-western part of the state. The tribe Khasi is sub-divided into seven sub-groups, namely - Khynriam, Pnar or Synteng, Bhoi, War (sub-divided into War-Jaintia and War-Khynriam), Maram, Lyngngam and Diko (Gopalakrishnan, 1995). They belong to the Indo-Mongoloid racial stock (Mukherjee and Khongsdier, 2003) and are linguistically placed under the Austro-Asiatic group as belonging to a sub-group known as the Mon-Khmer (Nagaraja, 2000).

Studied Villages

The selection of studied villages prioritized areas with a **predominantly Khasi population**, ensuring cultural homogeneity within the primary study group. Within **Nongstoin** block, four key villages were chosen for investigation: Pyndengrei, Seijlieh, Mawkhlam, and Nongspung. This selection aimed to provide a representative sample of villages within the block.

To achieve a more deeper understanding, several sub-villages within these larger villages were also selected. Specifically:

- **Pyndengrei:** Six sub-villages were included -Pdengshong, Tiehrit, Mawkhmahwir, Thadwang, Dommalein, and Mawiong. This allows for the exploration of potential variations in child health and nutritional status at a more localized level within Pyndengrei.
- **Seijlieh:** Four sub-villages were studied -Seijlieh II, Mawthothang, Pdengshong, and Mawiaban. Similar to Pyndengrei, this sub-village analysis can reveal intra-village differences.
- **Mawkhlam:** Four sub-villages were included -Mawtynrong, Mawkhlam II, Mawkhlam III, and Mawkhlam IV. Studying multiple sub-villages within Mawkhlam provides a broader perspective on this particular village.
- **Nongspung:** Only one sub-village, Mawnar, was studied. This might indicate a smaller or more homogenous structure within Nongspung, or potentially resource constraints that limited the scope of sub-village investigation here.

Crucially, the study design intentionally included villages **without existing ICDS (Integrated Child Development Service) centres** to establish a baseline and understand the impact of these services. Within Nongstoin block, the sub-villages of Pdengshong and Tiehrit (within Pyndengrei village) and Mawnar (of Nongspung village) lacked ICDS centres. This strategic

inclusion allows for a direct comparison between communities with and without ICDS intervention.

In **Ri-Muliang block**, the selection process focused on two Gram Sevak Circles: **Langja** and **Kyrdum**. This suggests an administrative or geographical clustering approach for village selection in this block.

- **Langja Gram Sevak Circle:** The villages of Langja, Kteihthawiar, and Ummawrie were studied.
- **Kyrdum Gram Sevak Circle:** The villages of Nonglang I, Nonglang II, Kyrdum, and Kyngdongngei were included.

Similar to Nongstoin block, the village of **Ummawrie in Ri-Muliang block was identified as not having an ICDS centre**. This further strengthens the study's ability to assess the role and impact of ICDS services on child health outcomes by including a comparison group in the second block

Studied Participants

A total of 346 households were covered from Nongstoin and Ri-Muliang block, selected through systematic random methods with the aim to study women of 15-49 years and children of 0-5 years. Out of these 346 households, a total of 351 women and 347 children were covered based on availability under required age groups.

Table 1: Village wise distribution of the studied households with Mother and Child Population

Block	Name of the Village	Total Households Covered	No. of Women (15 - 49 years)	No. of Children (0 - 5 years)
Nongstoin	Pdengshong	18 (5.20%)	27 (5.27%)	18 (3.80%)
	Teihrit	18 (5.20%)	22 (4.30%)	19 (4.01%)
	Mawkhmahwir	16 (4.62%)	25 (4.88%)	14 (2.95%)
	Thadwang	16 (4.62%)	24 (4.69%)	21 (4.43%)
	Dommalein	16 (4.62%)	23 (4.49%)	15 (3.16%)
	Mawiong	16 (4.62%)	19 (3.71%)	19 (4.01%)
	Seijlieh II	10 (2.89%)	18 (3.52%)	11 (2.32%)
	Mawthothang	11 (3.18%)	16 (3.13%)	12 (2.53%)
	Pdengshong	6 (1.73%)	9 (1.76%)	8 (1.69%)
	Mawiaban	8 (2.31%)	13 (2.54%)	7 (2.02%)
	Mawtynrong	10 (2.89%)	19 (3.71%)	8 (1.69%)
	Mawkhlam II	10 (2.89%)	18 (3.52%)	12 (2.53%)
	Mawkhlam III	9 (2.60%)	14 (2.73%)	10 (2.88%)
	Mawkhlam IV	11 (3.18%)	13 (2.54%)	12 (2.53%)

	Mawnar	13 (3.76%)	20 (3.91%)	15 (3.16%)
Ri-Muliang	Langja	22 (6.36%)	34 (6.64%)	38 (8.02%)
	Kteihthawiar	30 (8.67%)	38 (7.42%)	56 (11.81%)
	Ummawrie	11 (3.18%)	13 (2.54%)	25 (5.27%)
	Nonglang I	19 (5.49%)	27 (5.27%)	25 (5.27%)
	Nonglang II	26 (7.51%)	43 (8.40%)	43 (9.07%)
	Kyrdum	37 (10.69%)	57 (10.94%)	62 (13.08%)
	Kyndongngei	13 (3.76%)	20 (3.91%)	24 (5.06%)
	Total	346 (100%)	512 (100%)	474 (100%)

Data Collection

   Relevant data for this study were collected through an intensive as well as extensive household survey among the Khasi with the help of structured schedules of following categories.

- Part A - It covered general information of the informant and his/her family members related to their health status, general hygiene practices, morbidity and mortality status.

- Part B - It was exclusively for women (of 15-49 years of age), who belong to any physiological state of womanhood i.e., menarche, pregnancy, lactating and/or mother having child below 59 months of age.

- Part C - This schedule was used for the assessment of hygienic practices of women such as day - to - day b personal hygiene practices and menstrual hygiene practices, including addiction behaviour of women.

- Part D - It was to ascertain current nutritional health status of women and children through anthropometric measurements and hematological examinations.

Scores and Indices

To evaluate household hygiene status, specific variables were assigned scores, culminating in the calculation of a **Household Hygiene Index**. This index then served as the basis for categorizing all studied households within the two blocks of the present study into distinct hygiene levels: **Poor, Satisfactory, Above Average, and High.** This categorization allows for a nuanced understanding of the hygiene practices across the study population and facilitates comparisons between the two blocks.

Table 2: Scores for Variables of Household Hygiene Status

Questions	Score
1. Type of House	
Kaccha	1
Semi-Pucca	2

Pucca	3
2. Predominant material of the Roof	
Grass thatched/Bamboo/Wood/Mud	1
GI Metal/Asbestos sheets/Tin	2
Concrete	3
3. Predominant material of the Floor	
Mud	1
Wood/Bamboo	2
Bricks/Stone	3
Mosaic floor/Tiles/Marble/Cement	4
4. Source of Light	
No electricity	
Electricity	1
5. Cleaning of Rooms	
Once in a week	1
2-3 day in a week	2
Daily	3
6. Method of Cleaning	
Dry mopping	1
Mopping with plain water	2
Mopping with disinfectant	3
No cleaning	
7. Cooking Place/ Kitchen	
Cooking inside a room	1
Outdoor	2
Separate Kitchen	3
8. Mode of Cooking	
Open fire (temporary)	1
Kerosene	1.5
Traditional hearth + Earthen Chullah	2
Open fire + LPG	2.5
Open fire + Electric oven	3
Earthen Chullah + LPG	3.5
Electric oven	4
Electric oven + LPG	4.5
9. Utensils used for Cooking	
Earthen pot	1
Metallic (Aluminum/Steel/Iron pot)	2
10. Material used for Cleaning of Utensils	
Ash	1
Chemicals (Soap/Detergent)	2
11. Source of Water for Domestic uses	

Pond/Stream/River	1
Well / Tube well	2
Tap water/Piped water	3

12. Source of Drinking Water	
Pond/Stream/River	1
Well / Tube well	2
Tap water/ Piped water	3

13. Do you Purify Drinking water?	
No	0
Yes	1

14. If 'Yes' How Do You Purify Drinking water?	
Boil	1
Use water filter	2

15. Cleaning of water storage Pot	
Sometime	1
When Dirty	2
Fortnightly	3
Once in a week	4
2-3 day in a week	5
Daily	6

16. Method of disposal of household Garbage	
Disposed of within household yard or plot	1
Buried or burned	2
Collected by local civic body/ Collected by local NGOs	3

18. Drainage facility	
No drainage	0
Kaccha	1
Pucca	2

19. Type of Latrine	
Open/No Latrine	0
Flush latrine	1
Pit latrine without slab	2
Pit latrine with slab	3
Western Toilet	4

20. Source of Water in Toilet	
No	0
Yes	1

21. Any mosquito repellent used	
None	0
Electric vaporizer machine	1
Mosquitoes net	2

22. Do you use any material for keeping the flies and insects away?	
No	0
Yes	1
23. Do you keep any birds or goats/sheep/cattle/dogs within the premises of the house?	
Yes	0
No	1
24. Do you ensure cleanliness of the enclosures of birds/animals on a regular basis?	
No	0
Yes	1

The formula used to prepare the household hygiene index is: [Type of House (1) + Predominant material of the Roof (2) + Predominant material of the Floor (3) + Source of Light (4) + Cleaning of Rooms (5) + Method of Cleaning (6) + Cooking Place/ Kitchen (7) + Mode of Cooking (8) + Utensils used for Cooking (9) + Material used for Cleaning of Utensils (10) + Source of Water for Domestic uses (11) + Source of Drinking Water (12) + Do you Purify the Drinking water? (13) + If 'Yes' How Do You Purify Drinking water? (14) + Cleaning of water storage Pot (15) + Method of disposal of household Garbage (16) + Drainage facility (17) + Type of Latrine (18) + Source of Water in Toilet (19) + Any mosquito repellent used (20) + Do you use any material for keeping the flies and insects away? (21) + Do you keep any birds or goats/sheep/cattle/dogs within the premises of the house? (22) + Do you ensure cleanliness of the enclosures of birds/animals on a regular basis? (23)]

Table 3: Scores of household Hygiene Index based on Categories

Scores	Categories
0 - 15	Poor
16 - 30	Satisfactory
31 - 45	Above average
46 and above	High

To assess the household Hygiene index of individual studied household, the score was categorized into 4 categories namely, Poor (0 - 15), Satisfactory (16 - 30), Above average (31 - 45) and High (46 and above).

Further, to assess the personal hygienic sense and practices, variables such as washing of hands before meal, brushing of teeth, bathing place etc. were considered.

Table 4: Scores for variables of Personal Hygiene Status

Variables and parameters	Score
1. Do you wash hands before taking meals?	
No	0
Yes	1
1. 1If 'yes', how do you wash?	
With water only	1
With water and soap	2
2. How frequently do you brush your teeth?	
Once in a day	1
Twice in a day	2
3. What materials do you use for brushing?	
Tooth paste and brush	1
4. Bathing practice (during winter season)	
Once in a week	1
2-3days in a week	2
Everyday	3
5. Bathing practice (in other seasons)	
Once in a week	1
2-3days in a week	2
Everyday	3
6. Where do you take bath usually?	
Stream/Pond	1
Outside	2
Bathroom	3
7. How often do you use soap during bath?	
2-3days in a week	1
Every time	2
8. How often do you comb your hair?	
2-3days in a week	1
Everyday	2
9. How frequently do you trim your nails?	
Monthly	1
Fortnightly	2
Weekly	3
10. Do you use footwear habitually?	
No	0
Yes	1
11. Where do you usually go for defecation?	
Open Field	0

Common latrine/Community latrine	1
Private latrine	2
12. Do you wash your hands habitually after defecation?	
No	0
Yes	1
12.1.If 'yes', what material do you use for washing hands?	
Water only	1
Water and soap	2
Toilet Paper	3

The formula used to prepare the personal hygiene index is: [Do you wash your hands before taking meals regularly? (1) + If 'yes', how do you wash? (1.1) + How frequently do you brush your teeth? (2) + What materials do you use for brushing? (3) + Bathing Practice (in winter) (4) + Bathing Practice (in other seasons) (5) + Where do you normally take baths? (6) + How often do you use soap during bathing? (7) + How often do you comb your hair? (8) + How frequently do you trim your nails? (9) + Do you use footwear habitually? (10) + Where do you usually go for defecation? (11) + Do you wash your hands habitually after defecation? (12) + If 'yes', what material do you use for washing hands? (12.1)]

Table 5: Scores for variables of personal Hygiene Index

Scores	Categories
0 - 7	Poor
8 - 14	Satisfactory
15 - 21	Above average
22 and above	High

To assess the Personal Hygiene index for all studied individual, the score was categoriesd into 4 categories namely, Poor (0 - 7), Satisfactory (8 - 14), Above average (15 - 21) and High (22 and above).

Inclusion and Exclusion Criteria of the Present Study

Criteria for inclusion

- Children under the age of 5 years.

- Women, pregnant and lactating under the age group 15-49 years.

- Participants who have not given verbal consent.

Criteria for exclusion

- Children above 5 years of age.

- Women above 49 years and below 15 years of age.

- Individuals, who are suffering from physical deformities or chronic diseases.

Assessment of Nutritional Status

- For the assessmentofnutritionalstatus of women, anthropometric measurements, such as height, weight, mid-upper arm circumference, hip circumference, waist circumference and physiological variables, such as blood pressure, hemoglobin level and blood glucose level (random) were considered.

- For children, anthropometric measurements, such as height, weight, mid-upper arm circumference, head circumference, chest circumference and physiological variables like hemoglobin level were considered.

a) AnthropometricMeasurements

- Height- For women and children above 2 years of age, height was measured with the help of an Anthropometric rod to the nearest 0.10 cm and for children up to 2 years of age Infantometer was used to measure the height.

- Weight - Weight was measured with the help of a digital weighing machine (Omron, model - HN-286, manufactured by Krell Pricision Co., Ltd.)

- Mid-Upper Arm Circumference, Head Circumference, Chest Circumference, Waist Circumference, Hip Circumference -were measured with a Harpendene anthropometric tape (manufactured by Holtain Ltd).

Classification

● **Mid-Upper Arm Circumference (MUAC):** Mid-Upper Arm Circumference was measured to assess the status of malnourishment in both women and children.
● For the assessment of nutritional status of all adult women MUAC was measured as recommended by Tang, et.al. 2020. The criteria for the measurement of malnutrition are given as follows:

Normal	Undernourished
≥24	< 24

● For the assessment of nutritional status of children aged of 0-5 years MUAC was calculated using z-score as recommended by WHO, 2009. The criteria for the measurement of malnutrition are given as follows:

Normal	Moderate malnutrition	Severe malnutrition
-2SD to+2 SD	-3SD to+3 SD	>-3 SD to +3 SD

● **Waist Circumference:** Assessment of waist circumference of women was used to assess the risk of metabolic complications as recommended by WHO, 2011. Classification of assessment of risk of metabolism are given as follows:

Cut-off points	Risk of metabolic complications
>80	Increased
80.1- 87.9	Moderately increased
>88	Substantially increased

Derived Variables

● **Body-Mass Index (BMI):** From the body weight and height, Body Mass Index (BMI) is applied to evaluate current state nutritional status.
● For adult women -Body-Mass Index (BMI) was calculated to assess the nutritional status of women as recommended by World Health Organization (2004).

$$BMI = weight\ (kg)/height\ (m)^2$$

Classifications of the measurement of malnutrition are given as follows:

Under weight	Normal	Over weight
< 18.5 kg /m^2	18.5-24.9 kg /m^2	≥ 25 kg /m^2

● For children - Child growth standards of the World Health Organization, 2006 for 0-5 years of age and references developed by the World Health Organization based on z-scores were used. Z-scores were calculated using Microsoft Excel. For the assessment of nutritional status of children, derived variables such as height-for-age (stunting) and weight-for-age (wasting) were calculated using z-score.
Classifications for measuring different states of malnutrition are given as follows:

Normal	Moderate malnutrition	Severe malnutrition
-2SD to +2 SD	-3SD to +3 SD	>-3 SD to +3 SD

● **Waist-Hip Ratio (WHR):** With the help of the waist and hip circumference Waist-Hip

Ratio (WHR) was calculated. Waist-to-hip ratio was computed as *waist circumference (cm)/ hip circumference (cm)*. With the help of the Waist-Hip Ratio (WHR) risk of metabolic complications of women was analyzed as recommended by WHO, 2011.

The criteria for the measurement of risk of metabolism are given as follows:

Cut-off points	Risk of metabolic complications
< 0.85	Normal
>0.86	Risk

● **Waist-Height Ratio (WHtR):** Waist-height ratio was computed as *waist circumference (cm)/ height (cm)*. With the help of the waist-height ratio (WHtR) risk of central adiposity of women was analyzed using a reference recommended by Hsieh and Muto (2003). Classification of ascertaining risk of central adiposity are given as follows:

Cut-off points	Risk of central adiposity
≥ 0.5	Normal
< 0.86	Risk

Physiological Variables

● **Assessment of Anaemic Status:** The prevalence of anaemia was estimated by using the reference standards recommended by WHO (1968). Hemoglobin level (gm./dL.) was measured by the Haemoglobin testing apparatus of Mission Hb. Anaemic status of both women and children was assessed accordingly.

● For assessment of anaemic status of non - pregnant women of 15- 49 years, the reference criteria were taken as follows:

Normal	Mild anaemia	Moderate anaemia	Severe anaemia
≥ 12	11.0 -11.9	8.0-10.9	<8.0

● For assessment of anaemic status of pregnant women of 15-49 years reference criteria were taken as follows:

Normal	Mild anaemia	Moderate anaemia	Severe anaemia
≥ 11	10.0-10.9	7.0-9.9	<7.0

● **Assessment of Blood Glucose Level (random):** The prevalence of diabetes was estimated by using the reference standards recommended by American Diabetes Association, 2022. The blood glucose level (random) was measured by CODEFREE, Blood Glucose Monitoring System. For the assessment of blood glucose level (random) the following reference criteria were taken:

Normal	Pre-Diabetic	Diabetic
<140	140-199	>200

- **Assessment of Hypertension:** To measure blood pressure, an inflated cuff is usually placed around the arm. Omron Automatic Blood Pressure Monitor, model - HEM- 8712 was used for this purpose. Classification of blood pressure for the present study was followed by the recommendation of JNC8 (Eighth Report of the Joint National Committee) of WHO, 2015. Classification used for the assessment of hypertension are as follows:

Normal	Pre-Hypertension	Stage-I Hypertension	Stage-II Hypertension
SBP <120 and DBP <80	SBP 120-139 or DBP 80-89	SBP140-150 or DBP 90-99	SBP >160 or DBP >100

Data Entry and Analysis: For data entry and data analysis Microsoft Excel was used.

Chapter 1

Socio-Demographic Profile:

Table: 6. Age and Sex Distribution of the Khasi of Nongstoin Block of West Khasi Hills Districts of Meghalaya

Age groups (in years)	Sex		Total	Sex Ratio
	Male	Female		
0-4	73 (13.10%)	98 (16.87%)	171 (15.03%)	
5-9	88 (15.80%)	93 (16.01%)	181 (15.91%)	
10-14	81 (14.54%)	73 (12.56%)	154 (13.53%)	
(0-14)	242 (43.45%)	264 (45.44%)	506 (44.46%)	1090.91
15-19	55 (9.87%)	41 (7.06%)	96 (8.44%)	
20-24	42 (7.54%)	42 (7.23%)	84 (7.38%)	
25-29	42 (7.54%)	50 (8.60%)	92 (8.08%)	
30-34	63 (11.31%)	67 (11.53%)	130 (11.42%)	
35-39	44 (7.90%)	40 (6.88%)	84 (7.38%)	
40-44	25 (4.49%)	23 (3.96%)	48 (4.22%)	
45-49	9 (1.61%)	17 (2.92%)	26 (2.28%)	
(15-49)	280 (50.27%)	280 (48.19%)	560 (49.21%)	1000
50-54	11 (1.97%)	10 (1.72%)	21 (1.84%)	
55-59	5 (0.90%)	6 (1.03%)	11 (0.97%)	
60-64	5 (0.90%)	9 (1.55%)	14 (1.23%)	
(50-64)	21 (3.77%)	25 (4.30%)	46 (4.04%)	1190.48
65-69	4 (0.72%)	3 (0.52%)	7 (0.62%)	
70 +	10	9	19	

	(1.79%)	(1.55%)	(1.67%)	
(65 and above)	14 (2.51%)	12 (2.06%)	26 (2.28%)	857.14
Total	557 (48.94%)	581 (51.05%)	1138 (100.00%)	1043.09

The above represented the Age and Sex distribution of the Khasi of Nongstoin block in the West Khasi Hills District. The total number of populations is 1138 with 557 (48.94%) male and 581 (51.05%) female. In the studied population it is found that the overall sex ratio of the studied population of Nongstoin block is found to be 1043.09 female per 1000 male.

The studied population is categorized into four broad age groups. It is found that about 44.46% of population falls under pre-reproductive age group (0-14 years) with 43.45% male and 45.44% of female which is indicative of progressive growth of population with proportionate distribution of male and female population. As age group approaches towards most potential reproductive ages, it is found that male and female members are equal in number and ratio which is found to be 1000 female per 1000 male members. In the successive age group 50-64, the female member exceeds than the male members which is 1190.48 female per 1000 male. However, in the age group 65 and above the male members are slightly more than the female members which are 857.14 female per 1000 male. There is a sharp decline in the male and female population in the age group 65-69 showing 0.62% and 1.67% of age group 70+.

Fig. 1: Population Pyramid of Nongstoin Block of West Khasi Hills District of Meghalaya
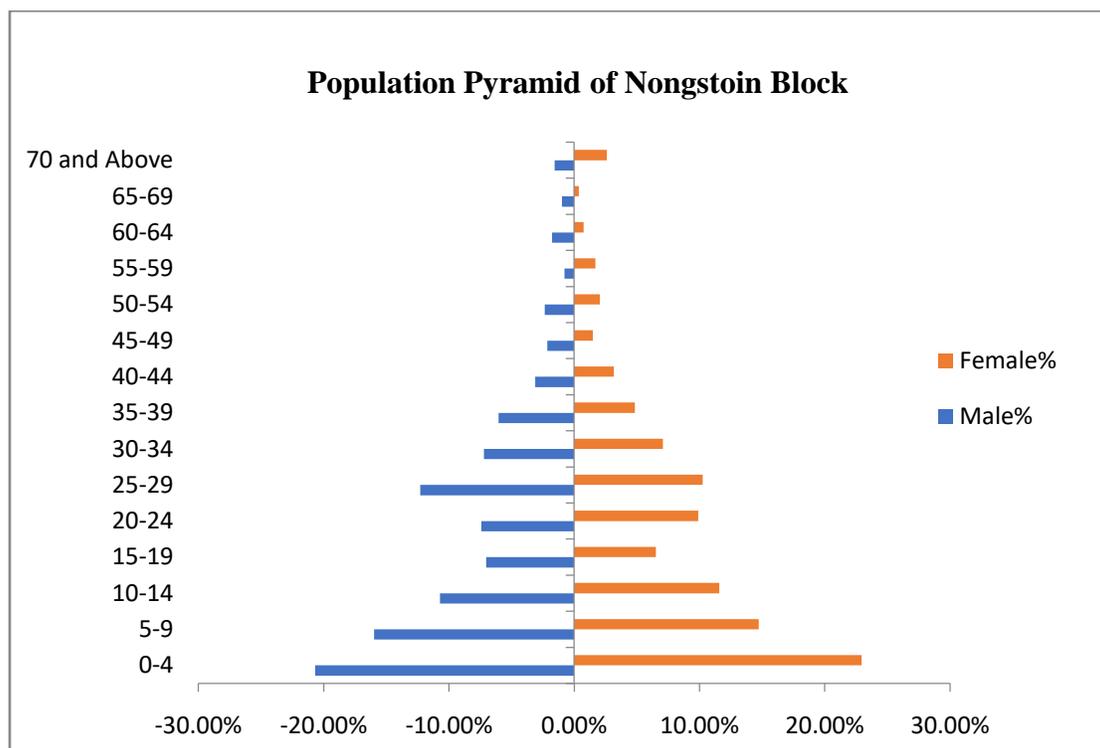
The population pyramid shows that the studied population of Nongstoin block has an expanding population as the age of 0-4 and 5-9 is broad indicating the high rate of fertility while the top of the pyramid is narrow in both age groups indicating low survival at old age.

Table 7: Age and Sex Distribution of the Khasi of Ri-Muliang Block of West Khasi Hills Districts of Meghalaya

Age groups (in years)	Sex		Total	Sex Ratio
	Male	Female		
0-4	106 (20.66%)	123 (22.95%)	229 (21.83%)	
5-9	82 (15.98%)	79 (14.74%)	161 (15.35%)	
10-14	55 (10.72%)	62 (11.57%)	117 (11.15%)	
(0-14)	243 (47.37%)	264 (49.25%)	507 (48.33%)	1086.42
15-19	36 (7.02%)	35 (6.53%)	71 (6.77%)	
20-24	38 (7.41%)	53 (9.89%)	91 (8.67%)	
25-29	63 (12.28%)	55 (10.26%)	118 (11.25%)	
30-34	37 (7.21%)	38 (7.09%)	75 (7.15%)	
35-39	31 (6.04%)	26 (4.85%)	57 (5.43%)	
40-44	16 (3.12%)	17 (3.17%)	33 (3.15%)	
45-49	11 (2.14%)	8 (1.49%)	19 (1.81%)	
(15-49)	232 (45.22%)	232 (43.28%)	464 (44.23%)	1000
50-54	12 (2.34%)	11 (2.05%)	23 (2.19%)	
55-59	4 (0.78%)	9 (1.68%)	13 (1.24%)	
60-64	9 (1.75%)	4 (0.75%)	13 (1.24%)	
(50-64)	25 (4.87%)	24 (4.48%)	49 (4.67%)	960
65-69	5 (0.97%)	2 (0.37%)	7 (0.67%)	
70 +	8 (1.56%)	14 (2.61%)	22 (2.10%)	

(65 and above)	13 (2.53%)	16 (2.99%)	29 (2.77%)	1230.77
Total	513 (48.90%)	536 (51.10%)	1049 (100.00%)	1044.83

The above table represented the Age and Sex distribution table of the Khasi of Ri-Muliang block in the West Khasi Hills District the total number of populations is 1049 with 513 (48.90%) male and 536 (51.10%) female. In the studied population it is found that the overall sex ratio of the studied population of Ri-Muliang block is found to be 1044.83 female per 1000 male.

The studied population is categorized into four major age groups. It is found that about 48.33% of population falls under pre-reproductive age group (0-14 years) with 47.37% male and 49.25% of female which is indicative of progressive growth of population with proportionate distribution of male and female members. As age group approaches toward most potential reproductive ages, it is found that male and female members are equal in number and ratio which is found to be 1000 female per 1000 male members. In the successive age group 50-64 the sex ratio is 960 males per 1000 female. However, in the age group 65 and above the female members are slightly higher than the male which is 1230.77 female per 1000 male. There is a sharp decline in the male and female population in the age group 65-69 showing 0.67% and 2.10% of age group 70+.

Fig. 2: Population Pyramid of Ri-Muliang Block of West Khasi Hills District of Meghalaya
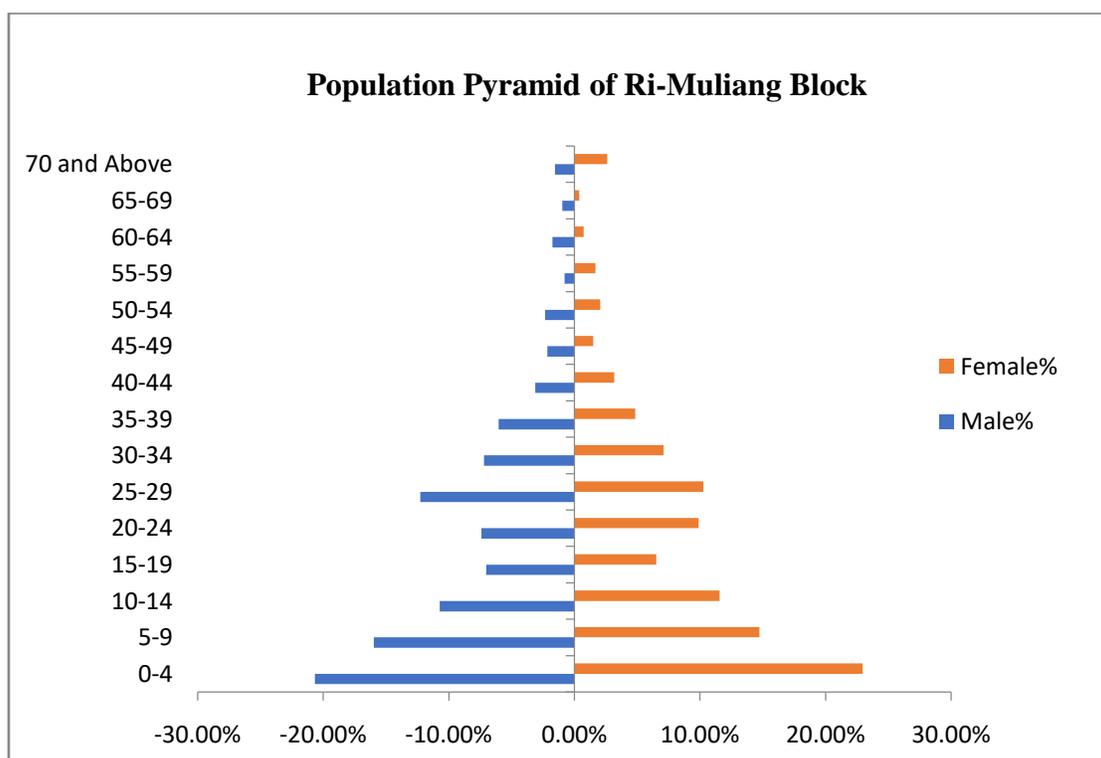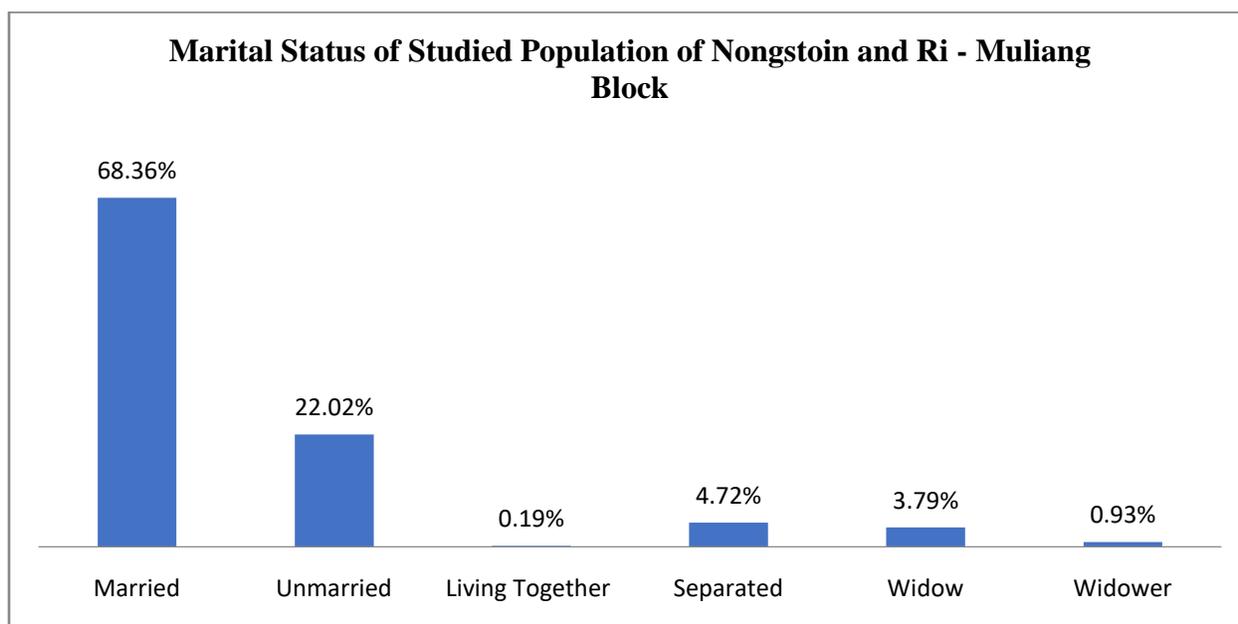
The population pyramid shows that the studied population of Ri-Muliang block has an expanding population as the age of 0-4 and 5-9 is broad indicating the high rate of fertility while the top of the pyramid is narrow in both age groups indicating low survival at old age.

Table 8: Sub Tribe distribution of the studied mothers of Nongstoin and Ri-Muliang Block of West Khasi Hills

Sub-Tribe	Nongstoin	Ri-Muliang	West Khasi Hills (2 Blocks)
Maram Khasi	188 (54.34%)	156 (45.09%)	344 (99.42%)
Muliang Khasi	0 (0.00%)	2 (0.58%)	2 (0.58%)
Total	188 (54.34%)	158 (45.66%)	346 (100.00%)

The above table showed the sub – tribe distribution of the studied female population of the Khasi community of Nongstoin and Ri-Muliangblocks of West Khasi Hills District of Meghalaya. Two sub – tribes were found namely, Maram Khasi and Muliang Khasi. In Nongstoin block, 54.34% of participants identified themselves as Maram Khasi whereas, in Ri-Muliang, 45.09% were identified. Only two female participants were identified as MuliangKhasi under Ri-Muliangblock.

Fig. 3: Marital Status of the studied population of Nongstoin and Ri-Muliang block of West Khasi Hills District

Marital Status of Studied Population of Nongstoin and Ri - Muliang Block

Married	68.36%
Unmarried	22.02%
Living Together	0.19%
Separated	4.72%
Widow	3.79%
Widower	0.93%

N.B. The number of not eligible (under 18 years old) including male and female of Nongstoin Block- 558 and Ri-Muliang Block- 548

Fig. 4: Marital Status of Studied Population of Nongstoin Block

Marital Status of Studied Population of Nongstoin Block
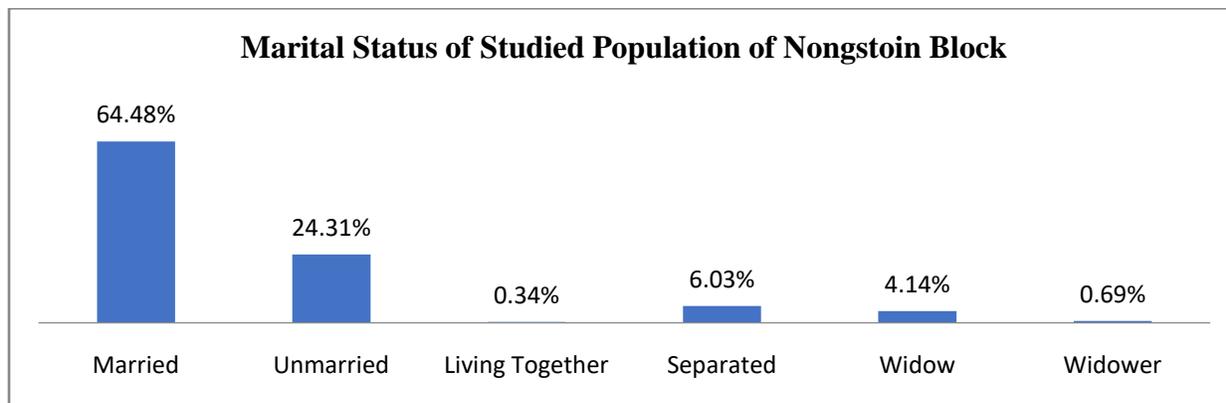
N.B. Total Population – 580 (including males and females). Out of 1138 individuals, 558 members including male and female were not eligible (under 18yrs).

Fig. 5: Marital Status of Studied Population of Ri-Muliang block

Marital Status of Studied Population of Ri - Muliang Block
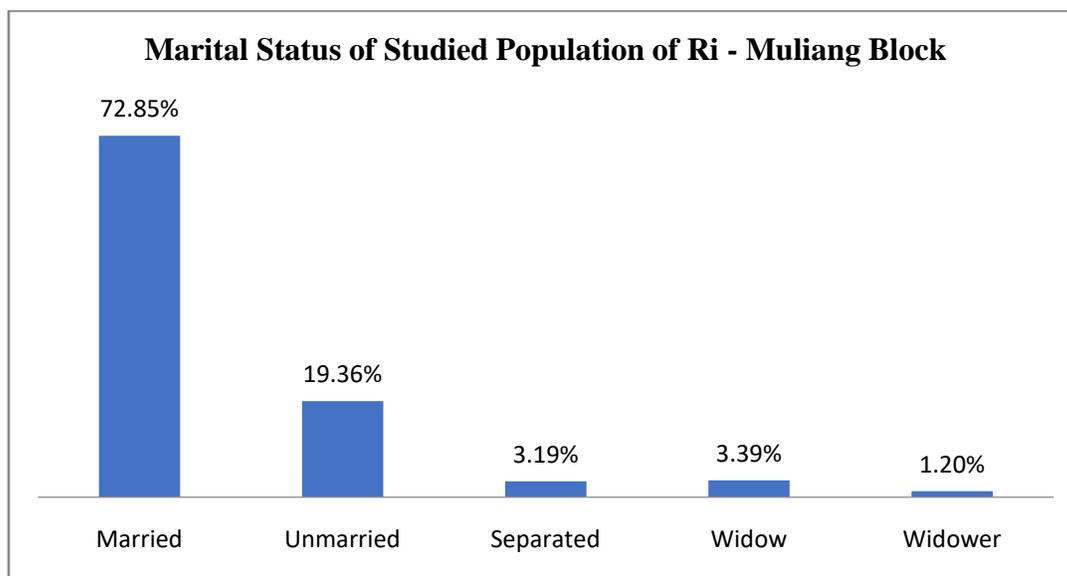
N.B. Total Population – 501 (including males and females). Out of 1049 individuals, 548 members including male and female were not eligible (under 18yrs).

The above figures demonstrate the marital status of the studied population in both the blocks of Nongstoin and Ri-Muliangin West Khasi Hills District of Meghalaya. The highest percentage of participants including both males and females were reported as married (68.36%) and which is also higher in both Nongstoin block (64.48%) and Ri-Muliang block (72.85%) followed by

unmarried individuals (22.02%). The percentage of unmarried individuals was higher in Nongstoinblock (24.31%) than Ri-Muliang block (19.36%). It was also reported that among the studied population 4.72% of participants were separated with higher frequencies being reported from Nongstoin block (6.03%) than Ri-Muliang block (3.19%). Again, the both the studied blocks widows were higher than widowers and only 0.19% of participants were found to be living together which was only reported from Nongstoin block (0.34%).

Table 9: Family Size of studied households of Nongstoin and Ri-Muliang Block of West Khasi Hills

Family Size (Members of the family)	Nongstoin	Ri-Muliang	West Khasi Hills (2 Blocks)
1-4	46 (13.29%)	37 (10.69%)	83 (23.99%)
5-9	128 (36.99%)	99 (28.61%)	227 (65.61%)
10 and above	14 (4.05%)	22 (6.36%)	36 (10.40%)
Total	188 (54.34%)	158 (45.66%)	346 (100%)

The above table demonstrates the family size of the studied participants of Nongstoin and Ri-Muliang block of West Khasi Hills District of Meghalaya. The family size of the present study has been categorized into three groups viz., 1 – 4, 5 – 9, and 10 and above. Total 13.29% of families of Nongstoin showed their family size 1 – 4 and 36.99% of families showed family size 5 – 9. Only 14 families (4.05%) from Nongstoin were identified with 10 and above family size. On the other hand, in case of Ri-Muliangblock, family size 5 – 9 was most prevalent (28.61%) followed by family size (10.69%). Only 6.36% of families were identified with family size 10 and above.

Table 10: Family type of the studied households of Nongstoin and Ri-Muliang Block of West Khasi Hills

Family Type	Nongstoin	Ri-Muliang	West Khasi Hills (2 Blocks)
Nuclear	124 (35.84%)	101 (29.19%)	225 (65.03%)
Nuclear Extended	8 (2.31%)	1 (0.29%)	9 (2.60%)
Joint	47 (13.58%)	47 (13.58%)	94 (27.17%)
Joint Extended	8 (2.31%)	9 (2.60%)	17 (4.91%)

Broken	1 (0.29%)	0 (0.00%)	1 (0.29%)
Total	188 (54.34%)	158 (45.66%)	346 (100%)

The above table demonstrates the family type of the studied participants of Nongstoin and Ri-Muliang block of West Khasi Hills District of Meghalaya. The family type of the present study was divided into following categories – nuclear, nuclear extended, joint, joint extended and broken. A total of 124 families (35.84%) from Nongstoin block were identified as nuclear, whereas, 101 families (29.19%) from Ri-Muliang block were identified as nuclear. Also, equal percentages of families (13.58%) from both Nongstoin and Ri-Muliang block were identified as joint families. Moreover, equal percentage of families (2.31%) from Nongstoin block were identified as nuclear extended and joint extended. On the other hand, only one family (0.29%) and 9 families (2.60%) from Ri-Muliang block were identified as nuclear extended and joint extended. However, only one family (0.29%) from Nongstoin block was identified as broken while no such family type was reported from Ri-Muliangblock.

Table 11: Educational Status of the total population under study of Nongstoin and Ri-Muliang Block

Educational Status	Nongstoin	Ri-Muliang	Total
Non-literate	43 (2.35%)	24 (1.31%)	67 (3.66%)
Pre-school	101 (5.52%)	109 (5.96%)	210 (11.48%)
Primary	289 (15.79%)	287 (15.68%)	576 (31.48%)
Upper-primary	184 (10.05%)	168 (9.18%)	352 (19.23%)
Secondary	167 (9.13%)	111 (6.07%)	278 (15.19%)
Higher-secondary	77 (4.21%)	63 (3.44%)	140 (7.65%)
Graduation and above	109 (5.96%)	35 (1.91%)	144 (7.87%)
Can Sign Only	10 (0.55%)	53 (2.90%)	63 (3.44%)
Total	980 (53.55%)	850 (46.45%)	1830 (100%)

N.B- Not eligible/No formal education started number of Nongstoin Block-158 and Ri-Muliang Block- 199, Total- 357

The above table represented the educational status of the studied population of both Nongstoin and Ri-Muliang Blocks. Based on the total population of 1,830 individuals, the table depicted
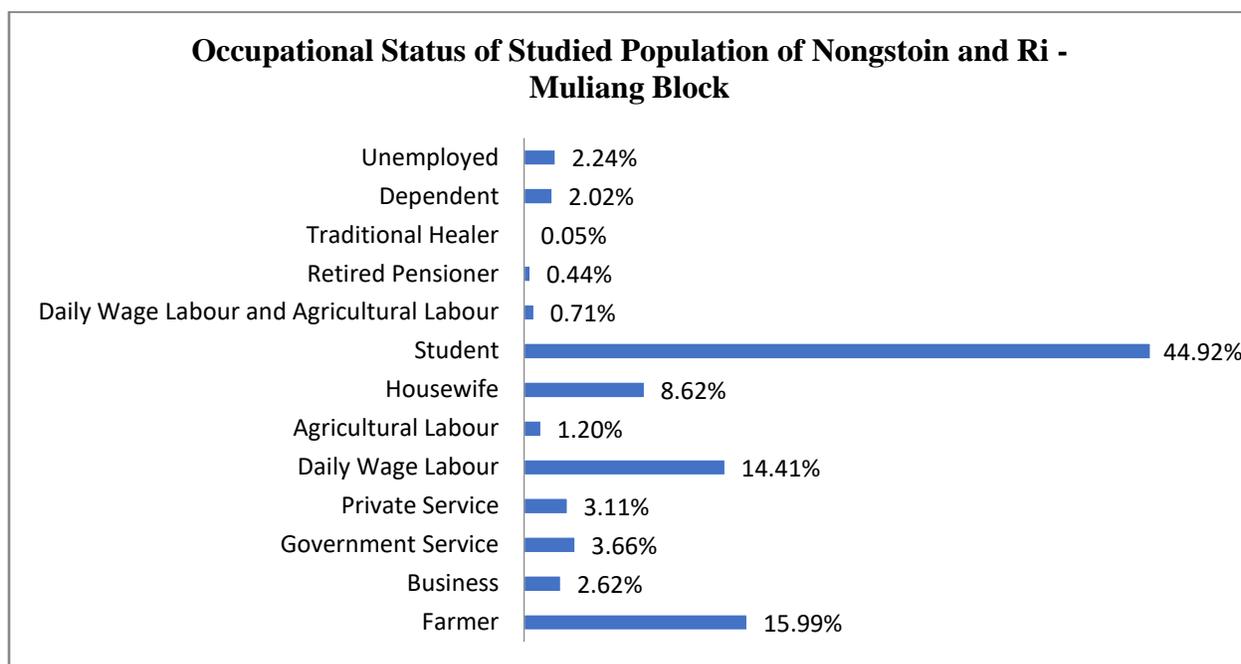
that primary education is the most common level of education attained, with 289 individuals (15.79%) from Nongstoin and 287 (15.68%) from Ri-Muliang. This is followed by upper-primary education, with 184 individuals (10.05%) from Nongstoin and 168 (9.18%) from Ri-Muliang. Secondary education is represented by 167 individuals (9.13%) from Nongstoin and 111 (6.07%) from Ri-Muliang. In terms of higher education, graduation and above includes 109 individuals (5.96%) from Nongstoin and 35 (1.91%) from Ri-Muliang, while higher-secondary is represented by 77 (4.21%) and 63 (3.44%) respectively. The pre-school category is slightly higher in Ri-Muliang (109; 5.96%) compared to Nongstoin (101; 5.52%). The non-literate group consists of 43 individuals (2.35%) from Nongstoin and 24 (1.31%) from Ri-Muliang. Notably, a higher proportion of individuals who can only sign are from Ri-Muliang (53; 2.90%) compared to Nongstoin (10; 0.55%). Overall, Nongstoin contributes 980 individuals (53.55%) and Ri-Muliang 850 individuals (46.45%) to the total surveyed population. The data suggests that Nongstoin Block has a relatively higher representation in the upper levels of education compared to Ri-Muliang.

Table 12: Overall Educational Status of the studied households of Nongstoin and Ri-Muliang block of West Khasi Hills District

Variables	Nongstoin	Ri - Muliang	West Khasi Hills (2 Blocks)
Poor	84 (24.28%)	88 (25.43%)	172 (49.71%)
Above average	57 (16.47%)	49 (14.16%)	106 (30.64%)
Satisfactory	43 (12.43%)	21 (6.07%)	64 (18.50%)
High	4 (1.16%)	0 (0.00%)	4 (1.15%)
Total	188 (54.34%)	158 (45.66%)	346 (100%)

The above table illustrates the overall educational status of the studied households of Nongstoin and Ri-Muliang block of West Khasi Hills District of Meghalaya. The households of both the block were studied on the basis of poor, above average, satisfactory and high based on their educational status. The highest percentages of households were reported to have poor educational status with 24.28% from Nongstoin block and 25.43% from Ri-Muliang block followed by 16.47% households from Nongstoin block and 14.16% households from Ri-Muliang block were identified as above average in their educational status. While, 43 families (12.34%) from Nongstoin block and 21 families (6.07%) from Ri-Muliang block were categorized as satisfactory in their educational status. Moreover, only 4 families (1.16%) from Nongstoin block were reported to have high educational status whereas, no family from Ri-Muliang block was reported in that category.

Fig. 6: Occupational Status of the studied population of Nongstoin and Ri-Muliang block of West Khasi Hills District

Occupational Status of Studied Population of Nongstoin and Ri - Muliang Block

Category	Percentage
Unemployed	2.24%
Dependent	2.02%
Traditional Healer	0.05%
Retired Pensioner	0.44%
Daily Wage Labour and Agricultural Labour	0.71%
Student	44.92%
Housewife	8.62%
Agricultural Labour	1.20%
Daily Wage Labour	14.41%
Private Service	3.11%
Government Service	3.66%
Business	2.62%
Farmer	15.99%

N.B. 355 individuals, including males and females from both blocks were not considered as they belong to the age group of 0 – 5 years.

Fig. 7: Occupational Status of Studied Population of Nongstoin Block

Occupational Status of Studied Population of Nongstoin Block

Category	Percentage
Unemployed	2.65%
Dependent	2.04%
Traditional Healer	0.10%
Retired Pensioner	0.82%
Daily Wage Labour and Agricultural Labour	0.41%
Student	46.59%
Housewife	12.23%
Agricultural Labour	0.82%
Daily Wage Labour	20.39%
Private Service	4.18%
Government Service	4.89%
Business	3.56%
Farmer	1.32%
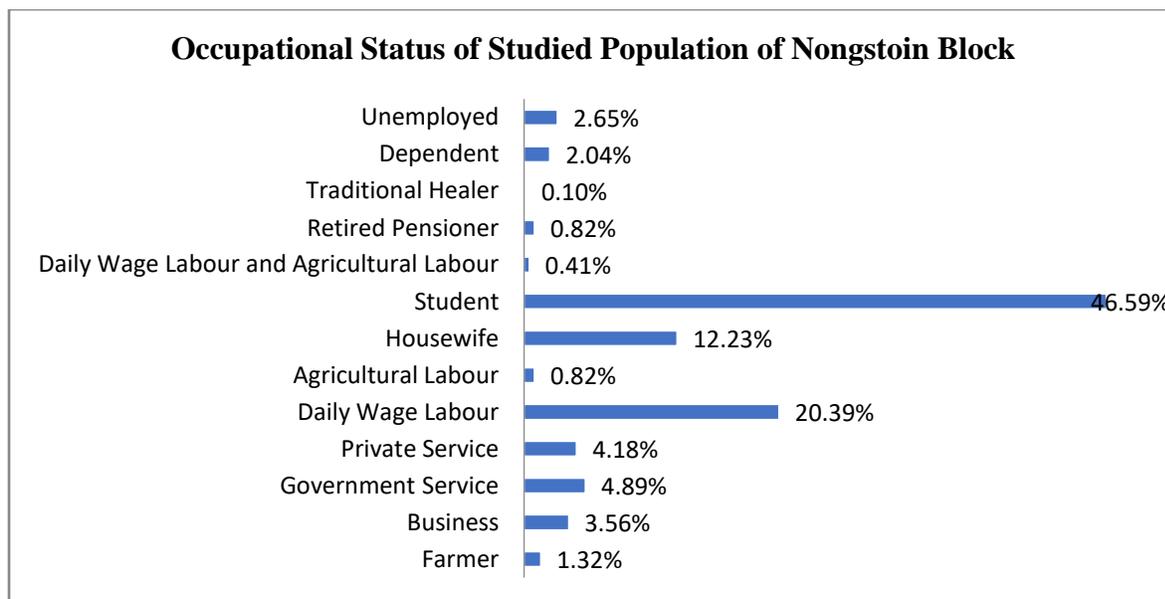
N.B. 157 individuals (including males and females) were not included in the category of occupational status as they belong to the age group of 0-5 years and considered as not eligible.

Fig. 8: Occupational Status of Studied Population of Ri - Muliang Block

Occupational Status of Studied Population of Ri - Muliang Block

Category	Percentage
Unemployed	1.76%
Dependent	2%
Daily Wage Labour and Agricultural Labour	1.06%
Student	43.01%
Housewife	4.47%
Agricultural Labour	1.64%
Daily Wage Labour	7.52%
Private Service	1.88%
Government Service	2.23%
Business	1.53%
Farmer	32.90%
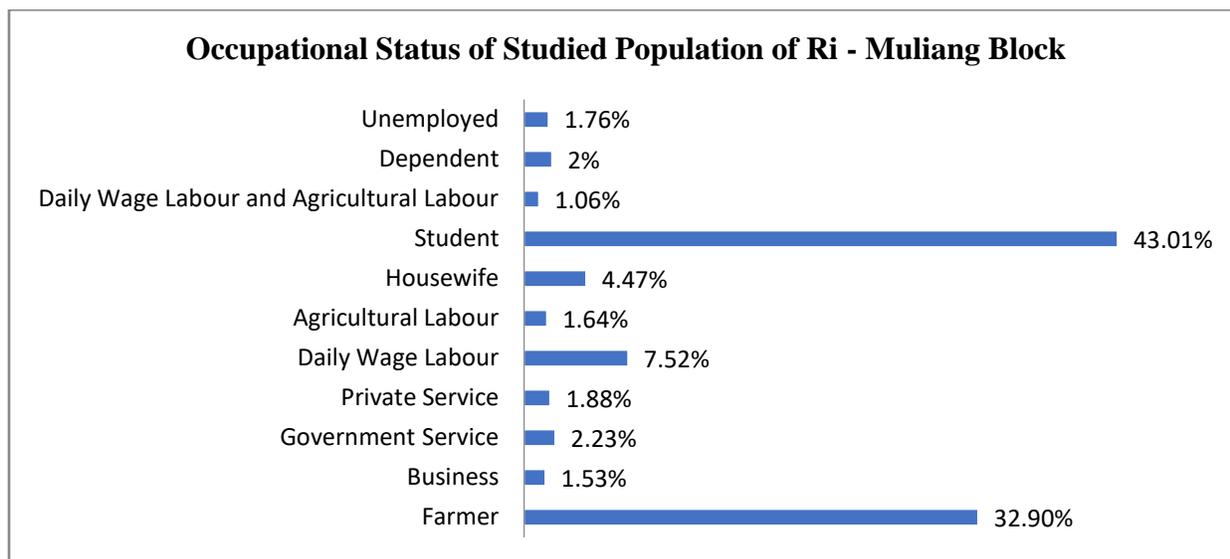
N.B. 198 individuals (including males and females) were not included in the category of occupational status as they belong to the age group of 0-5 years and considered as not eligible.

The occupational status of Nongstoin showed that only 1.32% of participants were farmers and 3.56% were engaged in business. 20.39% of individuals were engaged in daily wage labour and 0.82% were involved in agricultural labour along with some other mode of subsistence. Some individuals were found to be involved in both daily wage and agricultural labour activities (0.41%). 12.23% females were housewives and 46.59% were students in Nongstoin. In Ri-Muliangblock, 32.90% were farmers, significantly higher than Nongstoin block. Only 2.23% were engaged in government service which was much lower than Nongstoin block. Daily wage labour were reported as 7.52% and only 1.64% individuals were engaged in agriculture labour. 1.76% were identified as unemployed in Ri-Muliangblock.

In case of both Nongstoin and Ri-Muliangblock, 15.99% were farmers and 14.41% were engaged in daily wage labour. Only 8.62% females were housewives and 44.92% were found as students. Interestingly, a very few individuals (0.05%) were working as traditional healers. Overall, 2.65% were unemployed including both Nongstoin and Ri-Muliangblocks of West Khasi Hills.

Table 13: Monthly Income of the studied households of Nongstoin and Ri-Muliang Block of West Khasi Hills

Category (in Rupees)	Number of family (Nongstoin)	Number of family (Ri-Muliang)	Number of family (2 Blocks of West Khasi Hills)
0-25000	130	130	260

	(37.57%)	(37.57%)	(75.14%)
25001-50000	36 (10.40%)	24 (6.94%)	60 (17.34%)
50001-75000	10 (2.89%)	3 (0.87%)	13 (3.76%)
75001-100000	6 (1.73%)	0 (0.00%)	6 (1.73%)
100001-125000	4 (1.16%)	0 (0.00%)	4 (1.16%)
125001-150000	2 (0.58%)	1 (0.29%)	3 (0.87%)
Total	188 (54.34%)	158 (45.66%)	346 (100%)

The above table shows the monthly income of the studied households of Nongstoin and Ri-Muliangblocks of West Khasi Hills District. From the table it is clearly understood that, maximum percentages of families that is 37.57% had a monthly income up to rupees 25,000 and it is represented by both Nongstoin and Ri-Muliangblock. 36 families (10.40%) from Nongstoin block and 24 families (6.94%) from Ri-Muliang block had a monthly income from rupees 25,001 – 50,000. Also, in the income category of rupees 50,001 – 75,000, 10 families (2.89%) from Nongstoin block and 3 families (0.87%) from Ri-Muliang block were reported. However, families under the income group of rupees 75,001 – 1,00,000 and 1,00,001 – 1,25,000 families were reported only from Nongstoin block having a percentage of 1.73% and 1.66%. Moreover, only 2 families (0.58%) from Nongstoin block and 1 family (0.29%) from Ri-Muliang block were reported in the income category of 1,25,001 – 1,50,000.

Table 14: Monthly Per-capita Income of the studied households of Nongstoin and Ri-Muliang Block of West Khasi Hills

Category (in Rupees)	Number of family (Nongstoin)	Number of family (Ri-Muliang)	Number of family (2 Blocks of West Khasi Hills)
0-5000	140 (40.46%)	146 (42.20%)	286 (82.66%)
5001-10000	31 (8.96%)	9 (2.60%)	40 (11.56%)
10001-15000	8 (2.31%)	3 (0.87%)	11 (3.18%)
15001-20000	5 (1.45%)	0 (0.00%)	5 (1.45%)
20001-25000	2 (0.58%)	0 (0.00%)	2 (0.58%)
25001-30000	2 (0.58%)	0 (0.00%)	2 (0.58%)

Total	188 (54.34%)	158 (45.66%)	346 (100%)

The above table represents the monthly per – capita income of the studied households of Nongstoin and Ri-Muliang block of West Khasi Hills District of Meghalaya. The monthly per – capita income of the studied households were divided into the following categories – 0 – 5,000, 5,001 – 10,000, 10,001 – 15,000, 15,001 – 20,000, 20,001 – 25,000 and 25,001 – 30,000 respectively. Highest percentage of participants from both Nongstoin (40.46%) and Ri-Muliang block (42.20%) were reported to have per – capita monthly income up to rupees 5,000. While, 31 families (8.96%) from Nongstoin block and 9 families (2.60%) from Ri-Muliang block were reported under the monthly per – capita income category of rupees 5,001 – 10,000. Also, 8 families (2.31%) from Nongstoin block and 3 families (0.87%) from Ri-Muliang block were reported under the monthly per – capita income category of rupees 10,001 – 15,000. Moreover, under the monthly per – capita income categories of 15,001 – 20,000, 20,001 – 25,000 and 25,001 – 30,000, families were reported only from Nongstoin block with percentages of 1.45%, 0.58% and 0.58%.

Table 15: Annual Income of the studied households of Nongstoin and Ri-Muliang Block of West Khasi Hills

Category (in Rupees)	Number of family (Nongstoin)	Number of family (Ri-Muliang)	Number of family (2 Blocks of West Khasi Hills)
0-300000	130 (37.57%)	130 (37.57%)	260 (75.14%)
300001-600000	36 (10.40%)	24 (6.94%)	60 (17.34%)
600001-900000	10 (2.89%)	3 (0.87%)	13 (3.76%)
900001-1200000	6 (1.73%)	0 (0.00%)	6 (1.73%)
1200001-1500000	4 (1.16%)	0 (0.00%)	4 (1.16%)
1500001-1800000	2 (0.58%)	1 (0.29%)	3 (0.87%)
Total	188 (54.34%)	158 (45.66%)	346 (100%)

The above table shows the annual income of the studied households of Nongstoin and Ri-Muliangblocks of West Khasi Hills District. From the table it is clearly understood that, maximum percentages of families that is 37.57% had an annual income up to rupees 3,00,000 and it is represented by both Nongstoin and Ri-Muliangblock. 36 families (10.40%) from Nongstoin block and 24 families (6.94%) from Ri-Muliang block had an annual income from

rupees 3,00,001 – 6,00,000. Also, in the annual income category of rupees 6,00,001 – 9,00,000, 10 families (2.89%) from Nongstoin block and 3 families (0.87%) from Ri-Muliang block were reported. However, families under the annual income group of   rupees 9,00,001 – 12,00,000 and 12,00,001 – 15,00,000 families were reported only from Nongstoin block having a percentage of 1.73% and 1.66%. Moreover, only 2 families (0.58%) from Nongstoin block and 1 family (0.29%) from Ri-Muliang block were reported in the annual income category of 15,00,001 – 18,00,000.

Table 16: Annual Per-capita Income of the studied households of Nongstoin and Ri-Muliang Block of West Khasi Hills

Category (in Rupees)	Number of family (Nongstoin)	Number of family (Ri-Muliang)	Number of family (2 Blocks of West Khasi Hills)
0-25000	60 (17.34%)	85 (24.57%)	145 (41.91%)
25001-50000	73 (21.10%)	54 (15.61%)	127 (36.81%)
50001-75000	21 (6.07%)	14 (4.05%)	35 (10.12%)
75001-100000	11 (3.18%)	2 (0.58%)	13 (3.76%)
100001-125000	7 (2.02%)	0 (0.00%)	7 (2.02%)
125001-150000	4 (1.16%)	1 (0.29%)	5 (1.45%)
150001-175000	3 (0.87%)	1 (0.29%)	4 (1.16%)
175001-200000	0 (0.00%)	1 (0.29%)	1 (0.29%)
200001 and above	9 (2.60%)	0 (0.00%)	9 (2.60%)
Total	188 (54.34%)	158 (45.66%)	346 (100%)

The above table represents the annual per – capita income of the studied households of Nongstoin and Ri-Muliang block of West Khasi Hills District of Meghalaya. The annual per – capita income of the studied households were divided into the following categories – 0 – 25,000, 25,001 – 50,000, 50,001 – 75,000, 75,001 – 1,00,000, 1,00,001 – 1,25,000 and 125,001 – 1,50,000, 1,50,001 – 1,75,000, 1,75,001 – 2,00,000 and 2,00,001 and above respectively. Highest percentage of families from Nongstoin block (21.10%) were reported under the annual per – capita income category of rupees 25001 – 50000 whereas, highest percentage of families from Ri-Muliang block (24.57%) were reported to have per – capita annual income up to rupees

25,000. While, 21 families (6.07%) from Nongstoin block and 14 families (4.05%) from Ri-Muliang block were reported under the annual per – capita income category of rupees 50,001 – 75,000. Also, 3.18% families from Nongstoin block were reported under the annual per – capita income category of rupees 75,001 – 1,00,000 which is higher than the annual per – capita income of Ri-Muliangblock. However, 7 families (2.02%) from Nongstoin block were reported under the annual per – capita income category of 1,00,001 – 1,25,000, while no families from Ri-Muliang block were reported in this category. Also, equal number of participants from Ri-Muliang block that is 0.29% were reported from Ri-Muliang block under the annual per – capita income category of rupees 1,25,001 – 1,50,000, 1,50,001 – 1,75,000 and 1,75,001 – 2,00,000, whereas only 1.16% families and 0.87% of families from Nongstoin block were reported under the annual per – capita income category of 1,25,001 – 1,50,000, 1,50,001 – 1,75,000 and no families from Nongstoin block were reported under the annual per – capita income category of 1,75,001 – 2,00,000. Moreover, only 9 families (2.60%) belonged the annual per – capita income group of 2,00,001 and above which was from Nongstoin block.

Table 17: Overall Economic Status of the studied households of Nongstoin and Ri-Muliang block of West Khasi Hills District

Variables	Nongstoin	Ri - Muliang	West Khasi Hills (2 Blocks)
Poor	31 (8.96%)	29 (8.38%)	60 (17.34%)
Above average	87 (25.14%)	44 (12.72%)	131 (37.86%)
Satisfactory	65 (18.79%)	85 (24.57%)	150 (43.35%)
High	5 (1.45%)	0 (0.00%)	5 (1.45%)
Total	188 (54.34%)	158 (45.66%)	346 (100%)

The above table illustrates the economic status of the studied households of Nongstoin and Ri-Muliang block of West Khasi Hills District of Meghalaya. The households of both the block were studied on the basis of poor, above average, satisfactory and high based on their economic status. The highest percentages of households were reported to have above average economic status with 25.14% from Nongstoin block and 12.72% from Ri-Muliang block followed by 18.79% households from Nongstoin block and 24.57% households from Ri-Muliang block were identified as satisfactory in their economic status. While, 31 families (8.96%) from Nongstoin block and 29 families (8.38%) from Ri-Muliang block were categorized as poor in their economic status. Moreover, only 5 families (1.45%) from Nongstoin block were reported to have high economic status whereas, no family from Ri-Muliang block was reported in that category.

Table 18: Health Insurance Coverage of the studied population of Nongstoin and Ri-Muliang block of West Khasi Hills District

District	Male			Female		
	Covered	**Uncovered**	**Total**	**Covered**	**Uncovered**	**Total**
Nongstoin	345 (32.24%)	212 (19.81%)	557 (52.06%)	394 (35.27%)	187 (16.74%)	581 (52.01%)
Ri-Muliang	238 (22.24%)	275 (25.70%)	513 (47.94%)	248 (22.20%)	288 (25.78%)	536 (47.99%)
West Khasi Hills (2 Blocks)	583 (54.49%)	487 (45.51%)	1070 (100%)	642 (57.47%)	475 (42.52%)	1117 (100%)

The above table demonstrated the health insurance coverage of the studied population of Nongstoin and Ri-Muliang block of West Khasi Hills District. Here, it was found that 'Megha Health Insurance Scheme' (MHIS) was implemented in the convergence with the RashtriyaSwasthya Yojana (RSBY). This insurance coverage is from 1.6 lakhs – 5.3 lakhs for all citizens of the Meghalaya state.

The table showed that out of 557 males of Nongstoin, 345 (32.24%) were covered under the scheme. Again, out of 513 males of Ri-Muliang, 238 (22.24%) were covered. Again, in case of females of Nongstoin, out of 581, 394 (35.27%) were covered under the MHIS scheme, which was significantly higher than the females of Ri – Mulian block (22.02%). Overall, 54.49% of males and 57.47% of females including two blocks were covered under the MHIS scheme.

Chapter 2

Assessment of Community and Personal Hygienic Practices and Addiction Behaviour among the Mothers of the Khasi Community:

Hygiene is a condition and practices that help people to prevent the spread of the diseases and promote better health and well – being of the population. Hygienic practices include frequent washing of hands, face, clothes, food hygiene, water purifying and bathing with soap (Brahmanandan and Nagrajan, 2021). Practicing hygiene is difficult without potable water and proper sanitation. Lack of potable water and proper sanitation facility, poor hygienic practices is one of the major causes of diarrhea among children below five years of age in developing countries (Bassani *et al*., 2010). Hygiene practices are ever considered as one of the significant factors to ensure healthy leaving and well – being, especially in prevention of communicable diseases.

With the help of the data collected through "Schedule for Assessment of Hygienic Practices and Addictions" it was informed by the respondents of both Nongstoin and Ri-Muliang block that water is accessible in the studied villages through public taps, or public water lines into their yard or by a private water line from a private well or a private water source for which the respondents have to pay lease. In Khasi households' water is collected and stored in a pot known as *khiewphiang* which is made out of copper or aluminum and the main water storage area is present inside the house known as *jingbuh um* (*jingbuh* means to keep and *um* means water)/ *iingbuh um* (*iing* means house, *buh* means to keep and *um* means water). In the majority of the surveyed households, the respondents mentioned that they bathe in the *jingbuh um,* an area which is either square or rectangle in shape having a wodden frame without door but covered by a curtain. The *jingbuhum*has two levels, the upper level is about six to eight inches from the ground. The upper level is the place where water is stored in containers such as *khiewphiang* or plastic water storage containers of 50 or 100 litres. And the lower level is the area in which one bathes, wash dishes and wash clothes at times because there is a designated area for washing clothes which is ka *jakasaitjain (jaka* – place, *sait* – wash, *jain* – cloth). In the Khasi almanac, Saturday is called *ka sngisaitjain* (*sngi* means the Sun and also means day). Thus, according to the Khasis there is a designated day for washing clothes which is a Saturday according to the Gregorian calendar.

Pakyntein (2001) in a paper entitled "Cultural Dimension of Water in Khasi Society" writes that according to the Khasis, the water is either clean or dirty and accordingly has it purposes which is either used for drinking, cooking, cleaning and washing, The Khasis also have a perspective about the source of drinking and cooking water (*um bam, um dih*) and the water used for cleaning and washing (*um sait, um khlieng*). In the studied villages of Mawkhlam and Nongspung, under the Nongstoin Block of West Khasi Hills District the respondents mentioned that they collected water either from streams, rivulets or from the bed of a stream locally called

ka phud um. In Dong Mawiaban of Siejlieh village under Nongstoin Block the majority of the respondents received water from supply lines and water tanks set up by the Civil Hospital, Nongstoin as the hospital was in the area adjacent to the locality.

In Khasi- Pnar society there is a principle of "*ka imlang ka sahlang*" which means "staying and living together". The people of an area who are residents of a locality, a village or a town are part of society which is identified by the area inhabited by them and the principle/ philosophy of *"ka imlang ka sahlang"* is governed by the way of life of the people and their interdependence in their daily work of life, both personally and in the resident community in which one can associate oneself for the common good of the households and residents. Through the years the principle has helped the community grow in unison. A common exercise in community engagement which has ensured that there is cleanliness in the local surroundings is through community cleaning drives which are referred to as "*ka pynkhuid dong*" or "*ka pynkhuidshnong*" which are organised by the Dorbar Dongs, DorbarShnongs in the Khasi and Jaintia Hills. Cleanliness in a households, localities and villages is attributed to another Khasi principle, "*ka jinglehkhuidlehsuba*" (*jing* is a prefix to a verb or an adjective; *jing* – action, *khuid* – clean; *leh* – to do, perform; *suba* – clean) and this was observed in the Khasi villages surveyed in West Khasi Hills, *ka phyllaw* or the front porch of the house was very wellkept and clean; most houses had a small grass lawn and the others were graced by tidy mud surfaces. Cleanliness is directly related to healthy living and amongst the Khasis *"ka koit ka khiah"* (*koit* – healthy, well; *khiah* – healthy) is closely associated to "*ka jinglehkhuidlehsuba*". Kharkongor (2000) in a book *"Ka Par JingtipShaphang ka Koit Ka Khiah"* narrates about health and hygiene practices, and the ways in which one can stay healthy and maintain a healthy lifestyle.

Sten (1979) in a book *"Ki Sur Na Ka DuitaraKsiar"* narrates that there four seasons in the Khasi calendar which are known as *ki saw aiom – ka pyrem*(spring)*, ka lyiur*(rain), *ka synrai*(autumn) *bad ka tlang*(winter). The Khasi Hills is also home to two of the wettest places on Earth, Sohra and Mawsynram with the latter considered as the wettest place on Earth in 2024 with an average of 11,872 millimetres (467.4 inches) of rainfall annually. And the Khasi hills have a temperature which ranges between 4-16 degree Celsius in the winter months. Thus, most of the population bathe with warm water during these months. In the surveyed areas of West Khasi Hills district, the respondents boil water for bathing in aluminum pots and tin containers in an open fire with the firewood which they collect from the forest or by the firewood which they bought.

According to the Khasis there is a belief system where they consider a certain market day inauspicious in matters of personal hygiene i.e. the cutting of nails and the cutting of hair. The main market day of the Khasi Hills or *ka sngiiew duh*, a day which falls one every eight days of the Gregorian calendar is the day when such personal hygiene practices are not practiced because it is believed that there might be some shortfalls or shortcoming in the present day if not followed. During the fieldwork in the surveyed households there were cases where a respondent is still following such culture and traditions.

To understand the household hygiene practices and standards of the studied population, several criteria such as house type, source of illumination in dwelling areas, mode of cleaning, mode of cooking, environmental sanitation etc. were taken into consideration.

Table 19: House Type and Housing Pattern of Nongstoin and Ri-Muliang block of West Khasi Hills District

Type of House[1]	Nongstoin	Ri-Muliang	West Khasi Hills (2 Blocks)
Kaccha	11 (5.88%)	7 (4.43%)	18 (5.22%)
Semi-Pucca	139 (74.33%)	145 (91.77%)	284 (82.32%)
Pucca	37 (19.79%)	6 (3.80%)	43 (12.46%)
Total	187 (54.20%)	158(45.80%)	345 (100%)
Predominant material of the Roof[1]	**Nongstoin**	**Ri-Muliang**	**West Khasi Hills (2 Blocks)**
Grass thatched/Bamboo/Wood/Mud	4 (2.14%)	0 (0.00%)	4(1.16%)
GI Metal/Asbestos sheets/Tin	150 (80.21%)	152 (96.20%)	302(87.54%)
Concrete	33 (17.65%)	6 (3.80%)	39(11.30%)
Total	187 (54.20%)	158(45.80%)	345 (100%)
Predominant material of the Floor[1]	**Nongstoin**	**Ri-Muliang**	**West Khasi Hills (2 Blocks)**
Mud	3 (1.60%)	6 (3.80%)	9(2.61%)
Wood/Bamboo	37 (19.79%)	64 (40.51%)	101(29.27%)
Bricks/Stone	33 (17.65%)	27 (17.09%)	60(17.39%)
Mosaic floor/Tiles/Marble	114 (60.96%)	61 (38.61%)	175(50.72%)
Total	187 (54.20%)	158(45.80%)	345 (100%)
Source of Light[2]	**Nongstoin**	**Ri-Muliang**	**West Khasi Hills (2 Blocks)**
No Light	3 (1.61%)	21 (13.29%)	34(9.88%)
Electricity	183 (98.39%)	137 (86.71%)	320(93.02%)
Total	186 (54.07%)	158 (5.93%)	344 00%)

1. **One household data missing**
2. **Two household data missing**

Type of House

The table reveals the type of houses and housing pattern of the studied villages of Nongstoin and Ri-Muliangblock.The data collected on house type and housing patterns in West Khasi Hills reveal that most houses are semi-*pucca*. 139 out of 187 households i.e. 74.33% of houses in Nongstoinblock and 145 out of 158 households i.e. 91.77% of houses in Ri-Muliangblock are semi-pucca because the houses were built with wood and bamboo or had a tin roof. The houses were usually small with small windows and doors, they were dimly lit with very less natural light entering the housesAnother reason for the construction of semi pucca houses was that the resources such as timber and bamboo are readily available in the area. Houses and house type in Meghalaya showcase the architectural style of the houses in the area which is based on the Assam-type architecture which are houses built to be earthquake proof as

Meghalaya is situated in Seismic Zone-V. The architectural style of most of the survey houses in West Khasi Hills do not intrinsically follow the Assam-type architecture or are typical rectangular or L or C layout Assam-type houses with an inverse V slanting roof excepting a few. A majority of the houses were regular cabins wherein the floor was either lined with bamboo planks, a polished cemented floor or one which is primed with red or green oxide and in certain households where the residents were economically stable the floor was tiled.

Predominant material of the Roof

The data collected on the predominant material of roof in house types in West Khasi Hills reveal that most 150 out 187 houses i.e. 80.21% of houses in Nongstoin block and 152 out of 158 households i.e. 96.20% of houses in Ri-Muliang CNRD block used GI Metal/Asbestos sheets/Tin as roofing. And 33 out 187 houses i.e. 17.65% of houses in Nongstoin CNRD Block and 6 out of 158 households i.e. 3.80% of houses in Ri-Muliang CNRD Block used concrete as their roofing. In Khasi houses are called *üing/ ing* and in the Maram Khasi language, a house is known as *chung.* The is an anglicized spelling of the word because the letter "c" is not present in the Khasi alphabet). In Meghalaya houses are defined by predominant material used for roofing. Traditionally, the Khasi style of housing and architecture was an organic and sustainable housing pattern wherein one would use readily available forest products from in and around the area. A thatched hut is known as a *üingtrep* and a house which has a thatched roof is considered as a *üingtrep.* A house which has a tin roof is referred to as *üing* tin and a house have a concrete slab is locally known as *üing maw/ üingsleb/ üingdewbilat*which means house made of stone; house with a concrete slab; a concrete house or a house made with cement, respectively.

Source of Light

The data collected on source of light in West Khasi Hills reveal that only 3 out 186 households i.e. 1.61% of households in Nongstoin block and 21 out of 158 households i.e. 13.29% of households in Ri-Muliang block do not have electricity in their houses. The majority of houses in Nongstoin and Ri Muliang block which did not have electricity were nuclear families, wherein the daughter of the house shifted to a new cabin/house in same plot of land which belong to the mother. A few houses in Ri-Muliang block did not have access to electricity because they recently settled and built houses in villages falling under the Langja Gram Sevak Circle.

Table20: Cleanliness of the Households

Cleaning of Rooms	Nongstoin	Ri-Muliang	West Khasi Hills (2 Blocks)
No cleaning	0 (0.00%)	1 (0.63%)	1 (0.29%)
Once in a week	10 (5.38%)	7 (4.43%)	17(4.94%)
2-3 day in a week	38 (20.43%)	47 (29.75%)	85(24.71%)
Daily	138 (74.19%)	103 (65.19%)	241(70.06%)
Total	186 (54.07%)	158 (45.93%)	344 (100%)

Method of Cleaning*	Nongstoin	Ri-Muliang	West Khasi Hills (2 Blocks)
No cleaning	0 (0.00%)	1 (0.63%)	1(0.29%)
Dry mopping	5 (2.69%)	20 (12.66%)	25(7.27%)
Mopping with plain water	150 (80.64%)	131 (82.91%)	281(81.69%)
Mopping with disinfectant	31 (16.67%)	6 (4.80%)	37(10.76%)
Total	186 (54.07%)	158 (45.93%)	344(100%)

* Two household data missing

The table depicts the cleanliness pattern of the studied household of the Nomngstoin and Ri-Muliangblock. It shows that that only 1 that is 0.63% of the surveyed household, in Ummawrie village from Ri Muliang block do not clean their house and this is because their house is like a cabin with an approximate size of about 10' x 12' or 120 sq. ft. The cabin is built completely of bamboo and wood, the walls and the floor and made of bamboo and the uneven wooden pillars support the rusted and battered tin roof.

17 households i.e. 4.94% of surveyed households from both the blocks clean their house only once in a week, this is because of the economic condition of the family. The husband and wife are daily labourers doing odd jobs to make ends meet. They leave the house after their morning meals and return back after just before or after sunset on most working days. The adults leave their children in unlocked houses left to care for themselves or to be looked after and play with the neighbours children who are about the same age or a year or two older than their siblings.

The data also reveals that dry mopping is a method of cleaning for 25 households i.e. 7.27% of the studied population in both Nongstoinabd Ri-Muliangblock. These households were households that have wooden flooring in their houses and sweeping the house sufficed the need to clean the accumulated dust and mud. After sweeping, some households used a cloth to polish the wooden flooring.

Table 21: Cooking pattern of the household

Cooking Place/ Kitchen[3]	Nongstoin	Ri-Muliang	West Khasi Hills (2 Blocks)
Cooking inside a room	73 (39.46%)	92 (58.23%)	165(48.10%)
Separate Kitchen	112 (60.54%)	66 (41.77%)	178(51.90%)
Total	185 (53.94%)	158(46.06%)	343 (100%)
Mode of Cooking[2]	**Nongstoin**	**Ri-Muliang**	**West Khasi Hills (2 Blocks)**
Open fire (temporary)	46 (24.73%)	115 (72.78%)	161 (46.80%)
Earthen chullah / Traditional Hearth	7 (3.76%)	0 (0.00%)	7 (2.03%)
LPG	91 (48.92%)	11 (6.96%)	102 (29.65%)
Electric Oven	6 (3.23%)	4 (2.53%)	10 (2.91%)
Open fire or LPG	22 (11.83%)	20 (12.66%)	42 (12.21%)
Earthen Chullah or LPG	12 (6.45%)	0 (0.00%)	12 (3.49%)

Kerosene Stove	1 (0.54%)	0 (0.00%)	1 (0.29%)
Wood or Electric Oven	1(0.54%)	3 (1.90%)	4 (1.16%)
Electric Oven or LPG	0 (0.00%)	5 (3.16%)	5 (1.45%)
Total	186 (54.07%)	158 (45.93%)	344 (100%)
Utensils used for Cooking[2]	**Nongstoin**	**Ri-Muliang**	**West Khasi Hills (2 Blocks)**
Earthen pot	7 (3.76%)	1 (0.63%)	8(2.33%)
Metallic (Aluminium/Steel/Iron pot)	179 (96.24%)	157 (99.37%)	336(97.67%)
Total	186 (54.07%)	158 (45.93%)	344 (100%)
Material used for Cleaning of Utensils[2]	**Nongstoin**	**Ri-Muliang**	**West Khasi Hills (2 Blocks)**
Ash	1 (0.54%)	1 (0.63%)	2(0.58%)
Chemicals (Soap/Detergent)	185 (99.46%)	157 (99.37%)	342(99.42%)
Total	186 (54.07%)	1585.93%)	344(100%)

2. Two household data missing
3. Three household data missing

The table reveals the cooking pattern of households in Nongstoin and Ri-Muliang block of West Khasi Hills District. The table represents that a majority of households in Nongstoin block that is 60.54% have a separate kitchen for cooking whereas, majority of households in Ri-Muliang block that is 41.77% cook in the same room in which they are living without proper enclosure. Moreover, maximum of the cooking takes place using either in open fire (46.80%) followed by LPG (29.65%) and sometimes open fire or LPG (12.21%) respectively in both the blocks of Nongstoin and Ri-Muliang. Meanwhile some households from both the block uses either kerosene stove or electric oven as a mode of cooking. Using of earthen pots as an utensil for cooking were reported from few households that is 2.33%. As most of the households were using metallic utensils which is 97.67% of the studied population, they also have a practice of using either soap or detergent to clean their utensils. Cooking on metallic utensils with fuel from firewood which is either bought or collected from nearby areas is a common practice by the people of the region. Small and dried up branches and twigs are collected from nearby forests, the forest land may or may not belong to the households. Apart from collection of firewood, the people also collect seasonal wild edibles such a mushroom, tubers and vegetables. A fireplace for cooking and the traditional hearth is usually referred to as *dpei* meaning ash. In Khasi households the word *dpei* is symbolic as it means a household – joint or nuclear. Though there is no ash when the mode of cooking is LPG but the cooking place will still be known and considered as a *dpei*.

Table 22: Treatment of Household water

Source of water for household use	Nongstoin	Ri-Muliang	West Khasi Hills (2 Blocks)
Pond/Stream/River	5 (2.69%)	6 (3.80%)	11(3.20%)
Well/ Tubewell	15 (8.06%)	15 (9.49%)	30(8.72%)
Piped/ Tap water	166 (89.25%)	137 (86.71%)	303(88.08%)

Total	186 (54.07%)	158 (45.93%)	344 (100%)
Source of Drinking Water[2]	**Nongstoin**	**Ri-Muliang**	**West Khasi Hills (2 Blocks)**
Pond/Stream/River	5 (2.69%)	6 (3.80%)	11(3.20%)
Well/ Tubewell	15 (8.06%)	15 (9.49%)	30(8.72%)
Piped/ Tap water	166 (89.25%)	137 (86.71%)	303(88.08%)
Total	186 (54.07%)	158 (45.93%)	344 (100%)
Purification of Drinking water[2]	**Nongstoin**	**Ri-Muliang**	**West Khasi Hills (2 Blocks)**
No	1(0.54%)	6 (3.80%)	7(2.03%)
Yes	185(99.46%)	152 (96.20%)	337(97.97%)
Total	186 (54.07%)	158 (45.93%)	344 (100%)
Purification Method[3]	**Nongstoin**	**Ri-Muliang**	**West Khasi Hills (2 Blocks)**
Boil	174 (93.55%)	152 (96.20%)	326(96.74%)
Use water filter	11 (5.91%)	0 (0.00%)	11(3.26%)
Total	185 (54.90%)	152 (45.10%)	337 (100%)
Cleaning of water storage Pot[2]	**Nongstoin**	**Ri-Muliang**	**West Khasi Hills (2 Blocks)**
Sometimes	0 (0.00%)	3 (1.90%)	3(0.87%)
Fortnightly	16 (8.60%)	0 (0.00%)	16(4.65%)
Once in a week	48 (25.81%)	2 (1.27%)	75(21.80%)
2-3 day in a week	76 (40.86%)	59 (37.34%)	135(39.24%)
Daily	46 (24.73%)	69 (43.67%)	115(33.43%)
Total	186 (54.07%)	158 (45.93%)	344 (100%)

2. **Two household data missing**

3. **Three household data missing**

The table reveals the usage of water among the studied population of both Nongstoin and Ri-Muliangblock. It was found that majority of the households that is 88.08% uses tap water for domestic purposes and drinking. However, some households that is 3.20% and 8.72% depends on either pond or stream or well for water for their daily usage which they referred to as *phud* or *ka phud um.* The collected water was stored in drums or vessels and many households had a water storeroom which they called *jingbuh um.* In Nongstoin block treated water is supplied by the Public Health and Engineering Department and by Civil Hospital Nongstoin. 96.74% of the surveyed population boil the water before drinking and about 39.32% of the surveyed population clean the water storage pot once in 2-3 days followed by 33.43% of the households clean their water storage pot daily.

Table 23: Sanitation Status of the studied population

Method of disposal of household Garbage[2]	Nongstoin	Ri-Muliang	West Khasi Hills (2 Blocks)
Disposed of within household yard or plot	10 (5.38%)	44 (27.85%)	54(15.70%)
Buried or burned	60 (32.26%)	90 (56.96%)	150(43.60%)

Collected by local civic body/ Collected by local NGOs	116 (62.36%)	24 (15.19%)	140 (40.70%)
Total	186 (54.07%)	158 (45.93%)	344 (100%)
Drainage facility[2]	**Nongstoin**	**Ri-Muliang**	**West Khasi Hills (2 Blocks)**
No drainage	1 (0.54%)	1 (0.63%)	2(0.58%)
Kaccha	89 (47.85%)	125 (79.11%)	214(62.21%)
Pucca	96 (51.61%)	32 (20.25%)	128(37.21%)
Total	186 (54.07%)	157(85.93%)	344(100%)

2. **Two household data missing**

The table reveals the sanitation status of the studied population. The surveyed villages in West Khasi Hills District do not fall under the purview of the Municipal Corporation. ShnongPyndengrei in Nongstoin CNRD Block was the only area (taluk) that was under the Nongstoin Township Scheme. The surveyed villages had a proper system of garbage disposal which was managed by the households and the community. Most houses used the organic waste as pig feed for their own or their neighbours livestock. Households that did not have any livestock, they compost the waste and uses it for horticulture in their kitchen gardens. 43.60% of the studied population of both the blocks preferred either to burn or bury their household garbage followed by 40.70% of the garbages of the studied block were collected by local civic bodies or NGOs. Moreover, 15.70% of the studied blocks dispose their garbage within their household yard. Though the majority of the drainage facility i.e. 62.21% of the survey households was *kaccha*, they were clean; there was no water logging or stench. The water from the drains passed down through lower areas of the household plots or the village wherein the water seeps back into the earth.

Table 24: Toilet and Water facilities

Type of Toilet[2]	**Nongstoin**	**Ri-Muliang**	**West Khasi Hills (2 Blocks)**
Open field	0 (0.00%)	6 (3.80%)	6(1.74%)
Pit latrine without slab	20 (10.75%)	13(8.23%)	33(9.59%)
Pit latrine with slab	114 (61.29%)	51 (32.28%)	165(47.96%)
Flush Toilet	51 (27.42%)	88 (55.70%)	139(40.41%)
Western Toilet	1 (0.54%)	0 (0.00%)	1(0.29%)
Total	186 (54.07%)	158 (45.93%)	344 (100%)
Source of Water in Toilet[2]	**Nongstoin**	**Ri-Muliang**	**West Khasi Hills (2 Blocks)**
No	127 (68.28%)	67 (42.40%)	194(56.39%)
Yes	59 (31.72%)	91(57.60%)	150(43.60%)
Total	186 (54.07%)	158 (45.93%)	344 (100%)
Alternate Source of Water in Toilet	**Nongstoin**	**Ri-Muliang**	**West Khasi**

			Hills (2 Blocks)
Pond/Stream/River/Well	6 (4.72%)	1 (1.49%)	7(3.61%)
Piped water outside toilet	121 (95.28%)	66 (98.51%)	187(96.39%)
Total	127 (65.46%)	67 (34.54%)	194 (100%)

2. Two household data missing

The data collected on Toilet and Water facilities in Nongstoin and Ri-Muliang block reveals that a majority household i.e. about 47.96% have pit latrines with slab followed by 40.41% of the studied households have flush toilets with a septic tank respectively. Pit latrines without slabs were toilets wherein the base was lined by wooden planks. The pits were not below the slab but at a distance, the latrines have either tin or wooden planks on an inclined plane. Whereas, 1.76% of the studied population in Ri-Muliang block do nothave any toilet facility. As water is the inseparable part of basic amenities, 96.39% of the households from both the blocks store water to use after defecation.

Table 25: Use of insect repellent and cleanliness practices for Household premises

Preventive practices against mosquitoes	Nongstoin	Ri-Muliang	West Khasi Hills (2 Blocks)
No	6 (3.19%)	1 (0.63%%)	7 (2.02%)
Electric vaporizer machine	3 (1.60%)	0 (0.00%)	3 (0.87%)
Mosquito net	144 (91.14%)	152 (96.20%)	296 (85.54%)
Mosquito repellent	0 (0.00%)	0 (0.00%)	0 (0.00%)
Electric vaporizer machine/ Mosquito net	35 (18.62%)	4 (2.53%)	39 (11.27%)
Coil/ Mosquito net	0 (0.00%)	1 (0.63%)	1 (0.29%)
Total	**188 (54.34%%)**	**158 (45.66%)**	**346 (100%)**
Use of any material for keeping the flies and insects away[2]	**Nongstoin**	**Ri-Muliang**	**West Khasi Hills (2 Blocks)**
No	149 (80.11%)	146 (92.40%)	295(85.76%)
Yes	37 (19.89%)	12 (7.60%)	49(14.24%)
Total	186 (54.07%)	158 (45.93%)	344 (100%)
Keeping of any birds or goats/sheep/cattle/dogs within the premises of the house[2]	**Nongstoin**	**Ri-Muliang**	**West Khasi Hills (2 Blocks)**
Yes	44 (23.65%)	65 (41.14%)	109(31.69%)
No	142 (76.34%)	93 (58.86%)	235(68.31%)
Total	186 (54.07%)	158 (45.93%)	344 (100%)
Ensuring cleanliness of the enclosures of birds/animals on a regular basis[2]	**Nongstoin**	**Ri-Muliang**	**West Khasi Hills (2 Blocks)**
No	145 (77.96%)	95 (60.13%)	240(69.77%)
Yes	41 (22.04%)	63 (39.87%)	104(30.23%)
Total	186 (54.07%)	158 (45.93%)	344 (100%)

Cleaning Procedure	Nongstoin	Ri-Muliang	West Khasi Hills (2 Blocks)
With Water only	37 (90.24%)	55 (87.30%)	92(88.46%)
With Disinfectant/ Surf	4 (9.76%)	8 (12.70%)	12(11.54%)
Total	41(39.42%)	63(60.58%)	104(100.00%)

2. **Two household data missing**

The table shows the usage of insect repellent and cleanliness practices inNongstoin and Ri-Muliangblock. Majority of the households that is 85.54% of the total studied population of both the blocks uses mosquito nets to prevent mosquito bites, however, use of electric vaporizer machines to kill mosquitoes was also observed. Apart from these materials majority of households from both the blocks that is 85.76% do not use any materials to keep flies and insects away. Also, 31.69% of the studied household keep birds or goats or sheep inside their household premises but only 30.23% of the studied household ensure their cleanliness mostly with water.

Table 26: Household Hygiene Index of Nongstoin and Ri-Muliang block of West Khasi Hills

Score	Nongstoin*	Ri-Muliang	West Khasi Hills (2 Blocks)
Poor (0-15)	0	0	0
Satisfactory (16-30)	0	2(1.27%)	2(0.58%)
Above Average (31-45)	109(58.60%)	124(78.48%)	233(67.73%)
High (46 and above)	77(41.40%)	32(20.25%)	109(31.69%)
Total	**186(54.07%)**	**158(45.93%)**	**344(100%)**

*2 Household are excluded as data is missing.

The table depicts the household hygiene index of the studied population of Nongstoin and Ri-Muliangblock. The household index of the present study reveals that the maximum number of households were categorized as above average which is 67.73% followed by high household index (31.69%).

Table 27: Evaluation of Personal Hygiene of Nongstoin and Ri-Muliang block of West Khasi Hills District, Meghalaya

Regular hand washing before taking meal[1]	Nongstoin	Ri-Muliang	West Khasi Hills (2 Blocks)
No	0(0.00%)	0(0.00%)	0(0.00%)
Yes	187(100.00%)	158 (100%)	345(100%)
Total	187(54.20%)	158 (45.80%)	345(100%)
Material Used for washing hands (before taking meal) [1]	**Nongstoin**	**Ri-Muliang**	**West Khasi Hills (2 Blocks)**
With Water Only	40 (21.39%)	63 (39.87%)	242(70.14%)
With Water and Soap	147 (78.61%)	95 (60.13%)	102(29.56%)
Total	187 (54.20%)	158 (45.80%)	345 (100%)

Frequency of brushing Teeth [1]	Nongstoin	Ri-Muliang	West Khasi Hills (2 Blocks)
Once in a day	159 (85.03%)	121 (76.58%)	280 (81.16%)
Twice in a day	28 (43.85%)	37 (23.42%)	65 (18.84%)
Total	187 (54.20%)	158 (45.80%)	345 (100%)
Material used for brushing [1]	**Nongstoin**	**Ri-Muliang**	**West Khasi Hills (2 Blocks)**
Toothpaste and brush	187 (54.20%)	158 (45.80%)	345(100%)
Bathing practice (in winter) [1]	**Nongstoin**	**Ri-Muliang**	**West Khasi Hills (2 Blocks)**
Once in a week	10(5.35%)	8 (5.06%)	18 (5.22%)
2-3 day in a week	155 (82.89%)	147 (93.04%)	302 (87.54%)
Everyday	22 (11.76%)	3 (1.90%)	25 (7.25%)
Total	187 (54.20%)	158 (45.80%)	345 (100%)
Bathing practice (in other season) [1]	**Nongstoin**	**Ri-Muliang**	**West Khasi Hills (2 Blocks)**
Once in a week	1 (0.53%)	3 (1.90%)	4 (1.16%)
2-3 day in a week	73 (39.04%)	41 (25.95%)	114 (33.04%)
Everyday	113 (60.43%)	114 (72.15%)	227 (65.80%)
Total	187 (54.20%)	158 (45.80%)	345 (100%)
Place of Bathing [1]	**Nongstoin**	**Ri-Muliang**	**West Khasi Hills (2 Blocks)**
Stream	14 (21.92%)	4 (2.53%)	18 (5.22%)
Outside	1 (0.53%)	55 (34.81%)	56 (16.23%)
Bathroom	162 (86.63%)	47 (29.75%)	209 (60.58%)
Other (Jingbuh Um, Water Storage Area)/(River)	10 (5.35%)	52 (32.91%)	62 (17.97%)
Total	187(54.20%)	158(45.80%)	345(100%)
Frequency of soap use during bath[1]	**Nongstoin**	**Ri-Muliang**	**West Khasi Hills (2 Blocks)**
2-3 day in a week	31 (16.58%)	5 (3.16%)	36 (10.43%)
Every time	156 (83.42%)	153 (96.83%)	309 (89.56%)
Total	187 (54.20%)	158 (45.80%)	345 (100%)
Frequency of hair combing [2]	**Nongstoin**	**Ri-Muliang**	**West Khasi Hills (2 Blocks)**
2-3 days in a week	2 (1.07%)	8 (5.06%)	10 (2.91%)
Everyday	184 (98.92%)	141 (89.24%)	325 (94.48%)
Fortnightly	0 (0.00%)	1 (0.63%)	1 (0.29%)
Once in a week	0 (0.00%)	8 (5.06%)	8 (2.32%)
Total	186 (54.07%)	158 (45.93%)	344 (100%)
Frequency of nail trimming [2]	**Nongstoin**	**Ri-Muliang**	**West Khasi Hills (2 Blocks)**
Weekly	4 (2.15%)	2 (1.26%)	6 (1.74%)
When it grows	31 (16.67%)	36 (22.78%)	67 (19.48%)
Fortnightly	107 (57.53%)	111 (70.25%)	218 (63.37%)
Monthly	44 (23.65%)	9 (5.70%)	53 (15.41%)
Total	186 (54.07%)	158 (45.93%)	344 (100%)
Habitually use of footwear [2]	**Nongstoin**	**Ri-Muliang**	**West Khasi Hills (2 Blocks)**

No	1 (0.54%)	0 (0.00%)	1 (0.29%)
Yes	185 (99.46%)	158 (100%)	343 (99.71%)
Total	186 (54.07%)	158 (45.93%)	344 (100%)
Place of defecation[2]	**Nongstoin**	**Ri-Muliang**	**West Khasi Hills (2 Blocks)**
Open field	0 (0.00%)	1 (0.63%)	1 (0.29%)
Common Latrine/ Community Latrine	1 (0.54%)	1 (0.63%)	2 (0.58%)
Private Latrine	185 (99.46%)	156 (98.73%)	341 (99.13%)
Total	186 (54.07%)	158 (45.93%)	344 (100%)
Habit of washing hand after defecation [2]	**Nongstoin**	**Ri-Muliang**	**West Khasi Hills (2 Blocks)**
No	1 (0.54%)	0 (0.00%)	1 (0.29%)
Yes	185 (99.46%)	158 (100%)	343 (99.71%)
Total	186 (54.07%)	158 (45.93%)	344 (100%)
Material Used for washing hands (after defecation) [2]	**Nongstoin**	**Ri-Muliang**	**West Khasi Hills (2 Blocks)**
Water Only	12 (6.45%)	3 (1.90%)	15 (4.36%)
Water and Soap	174 (93.55%)	155 (98.10%)	329 (95.64%)
Total	186 (54.07%)	158 5.93%)	344 (100%)

1. **One household data missing**

2. **Two household data missing**

The table reveals the practices of personal hygiene standards among the studied mothers of Nongsoin and Ri-Muliangblock. It was observed that 70.14% of the studied women has the habit of washing hands before meals. 81.16% of the women have the habit of brushing teeth once in a day with toothbrush and toothpaste. More than half of the studied women that is 87.54% bath 2-3 days in a week during the winter months and 65.80% of women bath almost every day during summer months in bathrooms or *Jingbuh um.* It was reported that 94.48% of women of the studied blocks were habituated in daily combing of hairs, though 63.37% of women were reported to practice trimming of nails fortnightly. Most of the studied women (99.71%) use footwear regularly. Also, majority of women that is 99.13% have access to private latrine. Only 1 household (0.29%) practiced open defecation because they live in the forest in Ummawrie village and they have abundant land in the forest.

Table 28: Personal Hygiene Index of Nongstoin and Ri-Muliang block of West Khasi Hills

Score	Nongstoin*	Ri-Muliang	West Khasi Hills (2 Blocks)
Poor (0-7)	0	0	0
Satisfactory (8-14)	0	0	0
Above Average (15-21)	12(6.42%)	9(5.70%)	21(6.09%)
High (22 and above)	175(93.58%)	149(94.30%)	324(93.91%)
Total	**187(54.20%)**	**158(45.80%)**	**345(100%)**

*1 Household was excluded as data is missing.

Considering every essential variable to introspect personal hygiene practices index among the studied women of both Nongstoin and Ri-Muliangblock, it was observed that out of 345 women 93.45% of them is reported to maintain a high standard of personal hygiene, whereas, some that 6.07% of women fall under the category of above average.

Table 29: Menstrual Hygiene Practices of Studied Mothers

Material Used During Menstruation [1]	Nongstoin	Ri-Muliang	West Khasi Hills (2 Blocks)
Cloth	51(27.27%)	75(47.47%)	126(36.52%)
Cloth and Sanitary Napkin	43(22.99%)	41(25.95%)	84(24.35%)
Sanitary Napkin	92(49.20%)	42(26.58%)	134(38.84%)
Total	187(54.20%)	158(45.80%)	345(100%)
Frequency of Changing of Material Used During Menstruation [1]	**Nongstoin**	**Ri-Muliang**	**West Khasi Hills (2 Blocks)**
Once	4(2.14%)	3(1.90%)	7(2.03%)
Twice	33(17.65%)	34(21.52%)	67(19.42%)
Thrice	129(68.98%)	75(47.47%)	204(59.13%)
More Than Thrice	21(11.23%)	46(29.11%)	67(19.42%)
Total	187(54.20%)	158(45.80%)	345(100%)
If, you use cloth, what is the general practice you follow	**Nongstoin**	**Ri-Muliang**	**West Khasi Hills (2 Blocks)**
Reuse /Use Fresh (Reuse in case of cloth, fresh in case of sanitary napkin)	3(3.13%)	0	3(1.40%)
Fresh	2(2.08%)	0	2(0.93%)
Wash and reuse	90(93.75%)	118[*] (100%)	208(97.20%)
No response	1(1.04%)	0	1(0.47%)
Total	96(44.86%)	118(55.14%)	214(100%)
Disposing of Used Material During Menstruation [2]	**Nongstoin**	**Ri-Muliang**	**West Khasi Hills (2 Blocks)**
Burn	77(41.40%)	131(82.91%)	208(60.46%)
Burry	3(1.61%)	5(3.16%)	8(2.32%)
Dispose into Garbage	78(41.93%)	1(0.63%)	79(22.96%)
Burn and Burry	0	3(1.90%)	3(0.87%)
Wash and Reuse	2(1.07%)	18(11.39%)	20(5.81%)
Total	186(54.07%)	158(45.93%)	344(100%)

* Among 118 women 43 women found using Sanitary Napkin and reusing of the same by washing

The data on menstrual health and hygiene in the two blocks of Nongstoin and Ri-Muliangreveals that the surveyed mothers used sanitary pads (38.84%), cloth (36.52%), and cloth and sanitary pads (24.35%). A majority of the surveyed female population that is 59.13%changed the material more than thrice in a day during menstruation. The participants would dispose the materials used

during menstruation by either burning (60.46%), burying (2.32%), dispose into garbage (22.96%), burn and burry (0.87%) and, wash and reuse (5.81%).

Table 30: Illness related to menstruation

Illness related to menstruation [1]	Nongstoin	Ri-Muliang	West Khasi Hills (2 Blocks)
Yes	83(44.38%)	65(41.14%)	148(42.90%)
No	104(55.61%)	93(58.86%)	197(57.10%)
Total	187(54.20%)	158(45.80%)	345(100%)
Types of illness during menstruation (if, yes)	**Nongstoin**	**Ri-Muliang**	**West Khasi Hills (2 Blocks)**
Back Pain and Joint Pain	1(1.20%)	0	1(0.67%)
Dysmenorrhea	36(43.37%)	15(23.08%)	51(34.46%)
Dysmenorrhea / Pelvic or abdominal or back pain	22(26.51%)	20(30.77%)	42(28.38%)
Dysmenorrhea/ Menorrhagia	4(4.82%)	0	4(2.70%)
Irregular Period	1(1.20%)	0	1(0.67%)
Menorrhagia	1(1.20%)	0	1(0.67%)
Menorrhagia/ Pelvic or abdominal or back pain	4(4.82%)	0	4(2.70%)
Pelvic or abdominal or back pain	12(14.46%)	30(46.15%)	42(28.38%)
Prolonged Bleeding	1(1.20%)	0	1(0.67%)
Weakness	1(1.20%)	0	1(0.67%)
Total	83(56.08%)	65(43.92%)	148(100%)

The data on illness related to menstruation reveals that 42.90% of the studied mothers have menstruation related illness such as back pain (0.67%), Dysmenorrhea (34.46%), Pelvic or abdominal or back pain (28.38%), menorrhagia (2.70%), pelvic or abdominal or back pain (28.38%); irregular periods, prolonged bleeding and weakness (0.67%).

Table 31: Opinion About Menstruation

Following of any taboo during menstruation [1]	Nongstoin	Ri-Muliang	West Khasi Hills (2 Blocks)
Yes	2(1.07%)	0	2(0.58%)
No	185(98.93%)	158 (100%)	343(99.42%)
Total	187(54.20%)	158(45.80%)	345(100%)
Opinion About Menstruation [1]	**Nongstoin**	**Ri-Muliang**	**West Khasi Hills (2 Blocks)**
Blessing/Womanhood	2(1.07%)	0	2(0.58%)
Dirty	5(2.67%)	1(0.63%)	6(1.74%)
God's Blessing	45 (24.06%)	50 (31.64%)	95 (27.54%)
It's Dirty/ Painful	2(1.07%)	0	2(0.58%)

It's Dirty/ Blessing	1(0.53%)	0	1(0.29%)
It's Natural/ Normal Process	4(2.14%)	0	4(1.16%)
It's Painful	7(3.74%)	11(6.96%)	18(5.22%)
It's Painful/Womanhood/Blessing	4(2.14%)	0	4(1.16%)
Meaning to Womanhood	90(48.13%)	96(60.76%)	186(53.91%)
No Response	27(14.44%)	0	27(7.82%)
Total	187(54.20%)	158(45.80%)	345(100%)

The data on the opinion about the menstruation as stated by the mothers of the studied blocks reveals that 27.54% of women feels that it is god's blessing while majority of the female participants that is 53.91% reveals that it gives meaning to womanhood followed by 0.58% of women stated that it is either painful or dirty. While 1.16% of women felt that is a natural process. Also some female participants that 14.44% from Nongstoin block had no opinions regarding menstruation.

Addiction Behaviour and Practices found in Nongstoin and Ri-Muliang block of West Khasi Hills District, Meghalaya:

During the survey among the Khasi community, it was observed that chewing of betel nuts (Areca *catechu)* were common practice among them. An estimated 600 million people, particularly in south-east asian countries, have the habit of chewing betel nuts in any form. Epidemiological studied suggest that 20% - 40% of the population over the age of 15 years in countries like India, Nepal and Pakistan are addicted with chewing of betel nut (Kumar *et al*., 2021).

In north – east India, people consume betel nut in various forms. In Meghalaya, betel nut is commonly called "*Kwai"* (Mahanta *et al,* 2015).

The Khasi food palette has an attachment to the consumption of *kwai(areca/ betle nut)* and *duma* (tobacco) which is etched in the community's culture. *Kwai* is symbolic and it coexists with a Khasi from the beginning till the end; *kwai* is offered as a welcome gesture and it also used to when a person is no longer living in the context *"Bam kwai ha dwar u Blei"* or the person has left to eat *kwai* in God's alter. *Kwai* is part and parcel of the Khasis culture and identity and is a very important tangible and intangible part of a people's culture. There is folk story about *u kwai* (betel nut), *tympew* (betel leaf), *kashun* (lime) and *duma sla* (tobacco leaf) and the unfortunate event which let to the death of four people. Nik, his steadfast friend Shing and his wife and a thief. wherein *kwai*symbolises the steadfast friend of Shing, Nik Mahajon, a wealthy man visited his friend house for dinner but sadly Shing didn't have rice to cook in his house to feed his friend which eventually led to Shing killing himself, followed by his wife who killed herself as well and they were both transfixed on one another. Nik Mahajon on seeking his friend and his wife

lying dead on the floor took in the same dagger and stabbed himself to death. And in the middle of the night a thief came to hide in the house after seeing the corpse of three others decided to also kill himself with the same dagger as the others. The story symbolises Nik as *kwai*, Shing and his wife as *tympew* and ka shun and the thief who hides in the corner as duma sla. The combination of *kwai*, *tympew* and ka shun creates a red liquid just like the blood shed by the four in the story. Thus, in Khasi society *kwai* has been treated as a bridge between the rich and the poor by the tradition of offering "*shikynteinkwai*" or a piece of *kwai* as a courtesy to any guest who visits a house.

Table 32: Addiction practices among the mothers of Nongstoin and Ri-Muliangblocks of West Khasi Hills District.

Addiction Practice	Nongstoin Block	Ri-Muliang Block	West Khasi Hills District (2 Blocks)
Only Chewing	145 (77.13%)	98 (62.02%)	243 (70.23%)
Chewing and Drinking	2 (1.06%)	0 (0.00%)	2 (0.58%)
Chewing and Smoking	2 (1.06%)	29 (18.35%)	31 (8.96%)
Smoking	0 (0.00%)	1 (0.63%)	1 (0.29%)
No Addiction	39 (20.74%)	30 (18.99%)	69 (19.94%)
Total	188 (54.33%)	158 (45.67%)	346 (100%)

The above table demonstrated the addiction practices and behavior of mothers of West Khasi Hills District of Meghalaya. From the table it is evident that chewing, drinking and smoking are the most prevalent practices among the studied mothers of West Khasi Hills. The most prevalent addiction practice was chewing only 70.23%. the other practices like chewing and drinking and smoking showed very nominal presence that is 0.58% and 8.96% respectively. Only 19.94% of studied mothers are devoid of any addiction.

Table 33: Use of substances among the mothers of Nongstoin and Ri-Muliangblocks of West Khasi Hills District

Use of substances	Nongstoin Block	Ri-Muliang Block	West Khasi Hills District (2 Blocks)
Betel Nut and Betel Leaf	127 (85.23%)	115 (90.55%)	242 (87.68%)
Betel Nut & Leaf and Tobacco	19 (12.75%)	12 (9.45%)	31 (11.23%)
Tobacco	3 (2.01%)	0 (0.00%)	3 (1.09%)
Total	149 (54.33%)	127 (45.67%)	276 (100%)

The above table depicts the usage of substances among the studied mothers of Nongstoin and Ri-Muliangblock. Here, out of 346 mothers only 276 mothers were taken into consideration,

excluding the mothers without any addiction (69) and the mother who smokes (1). From the table it can be understood that majority of studied mothers that is 87.68%, from both the blocks use only betel nut and betel leaf as a source of addiction. While 11.23% of studied mothers from both the blocks uses betel nut and betel leaf along with tobacco as a source of addiction. Moreover, the lowest percentage that is 1.09% of mothers from both the blocks are consuming tobacco.

Table 34: Frequency of consumption of betel nut and betel leaf (per day) among the mothers of Nongstoin and Ri-Muliangblocks of West Khasi Hills District

Frequency of Consumption per day (betel nut and betel leaf)	Nongstoin Block	Ri-Muliang Block	West Khasi Hills District (2 Blocks)
1-3	10 (7.87%)	45 (39.13%)	55 (22.73%)
4-6	97 (76.38%)	54 (46.96%)	151 (62.40%)
7-9	5 (3.94%)	5 (4.35%)	10 (4.13%)
10-15	15 (11.81%)	11 (9.56%)	26 (10.74%)
Total	127 (52.48%)	115 (47.52%)	242 (100%)

The above table shows the frequency of consumption of betel nut and leaf (per day) among the studied mothers of Nongstoin and Ri-Muliangblock. Here out of 346 mothers only those mothers (242) were taken into consideration who consume betel nut and betel leaf, excluding the mothers who consume tobacco (34), also the mothers without any addiction (69) and the mother who smokes (1) was excluded. Here, maximum of the studied mothers that is 62.40% from both the block consume betel nut and betel leaf 4 – 6 times in a day followed by 22.73% of mothers consume betel nut and betel leaf 1 – 3 in a day. Moreover, 10.74% of studied mothers from both the blocks consume betel nut and leaf 10 – 15 times in a day, while 4.13% of mothers consume betel nut and betel leaf 7 – 9 times in a day.

Chapter 3

Reproductive Status of Women and Maternal Care:

According to WHO maternal health refers to the period of women's health during pregnancy to child birth and post period. This chapter discusses the maternal health focusing on the pregnant and lactating mothers of Nongstoin and Ri-Muliang block under the West Khasi Hills District of Meghalaya which is under the purview of the objective of the study that is to **"Identify the extent of community involvement in health care and also the factors that promote and inhibit community involvement"**. This chapter explores the maternal health care practices among the Khasi mothers including the responses and access of the mothers (pregnant and lactating) to available facilities and health care provided by the government in the studied area. For the present study a sample of total 43 pregnant, 135 lactating mothers and 253 children up to 3 years of age were considered with various parameters for a comprehensive analysis. The chapter highlights the practices and preferences of traditional health care along with the use of existing modern health care in the studied area.

Section A
Pregnant Mothers of Khasi Community of West Khasi Hills

The following are the analysis, discussion, and observation on pregnant mothers of Nongstoin and Ri-Muliang block of West Khasi Hills District.

Table 35: Self reported complications faced during pregnancy

Complications	Nongstoin		Ri-Muliang		West Khasi Hills		
	Yes	No	Yes	No	Yes	No	Total
Weight Loss	7(77.78%)	11 (32.35%)	2 (22.22%)	23 (67.64%)	9 (20.93%)	34 (79.07%)	43 (100%)
Nausea and Vomiting	16 (48.48%)	2 (20%)	17 (51.51%)	8 (80%)	33 (76.74%)	10 (23.26%)	43 (100%)
High Blood Pressure	1 (33.33%)	17 (42.5%)	2 (66.67)	23 (57.5%)	3 (6.98%)	40 (93.02%)	43 (100%)
Severe Headache	8 (40%)	10 (43.48)	12 (60%)	13 (56.52%)	20 (46.51%)	23 (53.49%)	43 (100%)
Lower Back Pain	8 (38.09%)	10 (45.45%)	13 (61.90%)	12 (54.55%)	21 (48.84%)	22 (51.16%)	43 (100%)
Weight Gain	4 (26.67%)	14 (50%)	11 (73.33%)	14 (50%)	15 (34.88%)	28 (65.12%)	43 (100%)
Gestational Diabetes	1 (33.33%)	17 (42.5%)	2 (66.67%)	23 (57.5)	3 (6.98%)	40 (93.02%)	43 (100%)
Low Blood	3	15	4	21	7	36	43

Pressure	(42.86%)	(41.67%)	(57.14%)	(58.33%)	(16.28%)	(83.72%)	(100%)
Anaemia	1 (50%)	17 (41.46%)	1 (50%)	24 (58.54%)	2 (9.30%)	41 (95.35%)	43 (100%)
Multiple Complications (3 or more)	11 (42.31%)	7 (41.18%)	15 (57.69%)	10 (58.82%)	26 (60.47%)	17 (39.53%)	43 (100%)
No Complications	1 (14.28%)	17 (39.53%)	6 (85.71%)	19 (44.19%)	7 (16.28%)	36 (83.72%)	43 (100%)

The above table demonstrated self reported complications faced by women during pregnancy. In the present study a total of 43 pregnant women from both Nongstoin and Ri-Muliang block of West Khasi Hills were considered. Majority of pregnant women (33) were found to be suffering from nausea and vomiting, including 17 from Ri-Muliang and 16 from Nongstoin. A total of 26 pregnant women were reported to suffer from multiple complications (defined as experiencing at least 3 complications listed in the table). Among there, Ri-Muliang block showed a higher frequency (15 women) compared to Nongstoin block (11 women). In addition, a considerable number of pregnant women (21) reported experiencing lower back pain, with the highest representation from Ri-Muliang block. Similarily, 20 pregnant women reported severe headache during pregnancy, again following the trend of higher number form Ri-Muliang block. Notably 15 pregnant women were observed to have significant weight gain during pregnancy with Ri-Muliang showing higher frequency (11 women).

In an interview with the Auxilary Nurse and Midwife (ANM) of Kyrdum Sub-center of Kyrdum GS circle of Ri – Muliang block it is reported that there is a presence of high-risk pregnant mothers (out of 73 registered pregnant mothers 43 were found to be high risk pregnant mothers). According to Dangal (2006), a pregnancy is high risk when maternal or fetal complications present in the mother affect the health of the baby and the mothers. This complication is because of the persisting health complications from previous pregnancy, before pregnancy, or health problems before or during pregnancy. From the first-hand interview with the ANM "a pregnancy is considered or categorized as 'high risk' if the mother has conceived more than four times, are anaemic, and not maintained adequate spacing between two children". It was informed that most of the high-risk pregnant mothers suffer from anaemia. Among the Khasis (in the studied area) children are believed to have given as 'God's gift' which is reasoned to be the cause of low birth spacing and the cause of high risk and anaemia among mothers especially pregnant mothers.

Pregnant mothers in the studied area avail health benefits from various government schemes such as CM-SMS (Chief Minister's Safe Motherhood Scheme), JSY (Janani Suraksha Yojana), and PMMVY (Pradhan Mantri Matru Vandana Yojana). Under the JSY scheme, pregnant women and infants are provided with free treatment benefits of rupees 700 for institutional delivery and rupees 600 for home delivery. Under the CM-SMS pregnant mothers

are provided shelter in the nearby PHC (Primary Health Centre), CHC (Community Health Centre), or sub-center known as transit homes. The pregnant mothers are given the provision to stay ten days prior to their expected date of delivery. Under this scheme the pregnant women are provided with free medical checkups, medicines, food, and an amount of rupees 500 as a compensation who accompany the pregnant women under this scheme.

From the study it is observed that although a substantial effort is made by the government the presence of anaemia is prevalent which is because of low corporation to family planning programme as reported by the ANM while some mothers although they receive supplements and medicine from the health care centers, they are not keen to take medicines that are provided. It is found that among the studied pregnant mothers most of the mothers are unaware of the presence of anaemia however there are symptoms of persisting anaemia from the complications they reported during the current pregnancy.

Table 36: Current trimester of pregnant women of West Khasi Hills

Exact Trimester of Pregnancy	Nongstoin	Ri-Muliang	West Khasi Hills District (2 Blocks)
Ist Trimester (1-3 months)	6(75%)	2(25%)	8(18.61%)
2nd Trimester (4-6 months)	5(33.33%)	10(66.67%)	15(34.88%)
3rd Trimester (7-9 months)	7(35%)	13(65%)	20(46.51%)
Total	18(41.86%)	25(58.14%)	43(100%)

In the present study, it is found that among 43 pregnant women from the West Khasi Hills District the highest number of women were found to be in their 3rd trimester of pregnancy (46.51%), followed by 2nd trimester (34.88%), and lowest is found to be in their 1st trimester (18.61%) of pregnancy. In the 1st trimester out of total 8 pregnant women maximum number is found from Nongstoin block which is 6 women, followed by Ri-Muliang block which is 2 women. In the 2nd trimester out of 15 pregnant women the maximum number i.e., 10 is found from Ri-Muliang block followed by Nongstoin block which is 5 in total. In the 3rd trimester out of 20 pregnant women the maximum number i.e., 13 is found from Ri-Muliang block followed by Nongstoin block which is 7.

Table 37: Initial month of visit to the health care provider

Initial Month of Visit	Nongstoin	Ri-Muliang	West Khasi Hills District (2 Blocks)
1-2 months	7(46.67%)	8(53.33%)	15(34.88%)

3-4 months	7(38.89%)	11(61.11%)	18(41.86%)
5-6 months	3(33.33%)	6(66.67%)	9(20.93%)
No medical Consultation	1(100%)	0	1(2.33%)
Total	18(41.86%)	25(58.14%)	43(100%)

The table illustrates the month of the initial visit by pregnant women to a health care provider. Among 43 pregnant women from the West Khasi Hills District, the highest number (41.86%) reported visiting their nearby health care provider during the 3rd - 4th month of pregnancy. Additionally, 34.88% of the women made their first visit to a health center within the 1st - 2nd month of pregnancy.9 out of 43 pregnant women (20.93%) visited a health center for the first time during the 5th - 6th month of pregnancy. Notably, only one pregnant woman from the Nongstoin block had not visited a health center, indicating no medical consultation during her pregnancy.

Table 38: Initial person for consultation

Consulting Person	Nongstoin	Ri-Muliang	West Khasi Hills District (2 Blocks)
Govt. Staff*	13(34.21%)	25(65.79%)	38(90.48%)
Private Staff**	4(100%)	0	4(9.52%)
Total	17(40.48%)	25(59.52%)	42*(100%)

Note: *In the present study it is found that out of 43 pregnant women one mother from Nongstoin block was not consulting any person (Govt. staff or private staff) during her pregnancy.
Govt. Staff* ASHA, UPHC, Sub-Center, PHC, CHC, and Govt. Hospital
Private Staff**Private Clinic, and Private Hospital

In the present study it is found that when asked about the initial person for consultation during their pregnancy it is found that the highest number of women (90.48%) was found to be consulting the Government staff which are ASHA (Accredited Social Health Activist) , UPHC (Urban Primary Health Centre), Sub-Center, PHC (Primary Health Centre), CHC (Community Health Centre), and Govt. Hospital and notably four pregnant women from Nongstoin block were found to be consulting the private staff (9.52%) which are Private Clinic, and Private Hospital while no pregnant women were found to be consulting the private staff from Ri-Muliang block. In the present study, it is found that one mother from Nongstoin block was found not consulting any person (Govt. staff and private staff) during her pregnancy. It was found that the women who consult private staff during the pregnancy said that they could not rely on the facilities and doctors in the government health centers.

Table 39: Frequency of consulting with the health care provider

Frequency of Consulting	Nongstoin	Ri-Muliang	West Khasi Hills District (2 Blocks)
As per advised schedule	15(44.12%)	19(55.88%)	34(80.95%)
When it is required/complication	2(25%)	6(75%)	8(19.05%)
Total	17(40.48%)	25(59.52%)	42*(100%)

Note: *In the present study it is found that out of 43 pregnant women one mother from Nongstoin block was not consulting any person (Govt. staff or private staff) during her pregnancy.

In the present study it is found that when asked about the frequency of consulting with health care provider during their current pregnancy 80.95% were found consulting the health care provider as per advised schedule while 19.05% of women were found consulting health care providers only when there are complications. The study showed that out of pregnant who consults health care provider only when it is required or when there are complications, Ri-Muliang block showed a higher frequency of total 6 mothers (75%) while Nongstoin block showed comparatively a lower frequency of total 2 (25%) mothers.

Table 40: Receiving of health card

Health Card	Nongstoin	Ri-Muliang	West Khasi Hills District (2 Blocks)
Govt. Health Card	11(32.35%)	23(67.65%)	34(94.44%)
Private Health Card	2(100%)	0	2(5.56%)
No Health Card	4(71.43%)	2(28.57%)	6(13.95%)
Total	17(40.48%)	25(63.89%)	42*(100%)

Note: *In the present study it is found that out of 43 pregnant women one mother from Nongstoin block was not consulting any person (Govt. staff or private staff) during her pregnancy.

In the present study it is found that 34 pregnant women (94.44%) received the health card from the Government, while 2 women (5.56%) received private health card from Nongstoin block. In

the study it is found that out of 6 (13.95%) pregnant mothers who did not have health card in their current pregnancy 4(71.43%) was from Nongstoin block and 2 was (28.57%) from Ri-Muliangblock.The facilities received through health card are free blood test, urine test, and free medicine for the pregnant mothers. It is found that in the Nongstoin block all 13 pregnant mothers are availing facilities provided through the health card. However, in the Ri-Muliang block it is found that out of 23 pregnant mothers only 22 mothers were found to avail facilities through health card while 1 pregnant mother did not receive facilities provided through health card.

Table 41: Planned place of delivery

Planned Place of Delivery	Nongstoin	Ri-Muliang	West Khasi Hills District (2 Blocks)
Govt. Hospital	13(41.94%)	18(58.06%)	31(72.09%)
Private Hospital	3(60%)	2(40%)	5(11.63%)
Residence	1(16.67%)	5(83.33%)	6(13.95%)
Undecided	1(100%)	0	1(2.33%)
Total	18(41.86%)	25(58.14%)	43(100%)

In the present study, pregnant participants were asked about their planned place of delivery. Based on their response, the planned place of delivery was categorized into 4 groups: Government Hospitals, Private Hospitals, Residence, and Undecided. The findings indicated that 72.09% of pregnant women choose government hospital as their preferred place of delivery, with Ri-Muliang block showing the highest frequency of such preferences (58.06%). Only 11.63% (5 women) from both blocks of West Khasi Hills expressed a preference for delivering at private hospital with a higher frequency observed in the Nongstoin block.

Interestingly, pregnant women who preferred to give birth at home, 83.33% were from Ri-Muliang block and 16.67% were found from Nongstoin block. Additionally, one respondent from Nongstoin block had not yet decided on a place of delivery during the study. In the study the pregnant mother responded that they have their mother and a traditional birth attendant who will assist during birth therefore they do not need to seek a medical doctor while some pregnant mother preferred to give birth at home for comfort and emotional support from their family especially mother and husband. A mother from Ri-Muliang block responded that her husband will help her in child delivery.

Table 42: Expected birth attendant

Who will facilitate the delivery?	Nongstoin	Ri-Muliang	West Khasi Hills District (2 Blocks)
Doctor	16(44.44%)	20(55.56%)	36(83.72%)
Family members	0	3(100%)	3(6.98%)
Traditional Dai (Traditional Birth Attendant)	1(33.33%)	2(66.67%)	3(6.98%)
Undecided	1(100%)	0	1(2.32%)
Total	18(41.86%)	25(58.14%)	43(100%)

In the present study based on the response of pregnant mothers on the expected birth attendant during their delivery the following person who will facilitate their delivery was categorized into the following groups: Doctor, Family members, Traditional Dai or Traditional birth attendant, and undecided.

It was found that 83.72% the pregnant mothers will be facilitated by the doctor during birth with Ri-Muliang block showing the highest number of frequency (55.56%). Interestingly, it is found that 6.98% of whom were from Ri-Muliang block responded Family Members during their delivery. 6.98% of women from the studied pregnant mothers responded traditional Dai or Traditional birth attendant during birth with Ri-Muliang showing higher frequency 66.67%. Additionally, one from Nongstoin block has not planned for who will be her birth attendant. In the studied area a work shop is often organized by PHC (Primary Health Centre) for traditional dai or traditional birth attendant where they are trained by medical officials for safe practices of delivery. While the family members who help in child delivery are mothers, grandmothers, or husband of the pregnant women.

Table 43: Vaccination of pregnant mothers

Vaccination	Available Mother		1st Dose		2st Dose		3st Dose		Total
	Nongstoin	Ri-Muliang	Nongstoin	Ri-Muliang	Nongstoin	Ri-Muliang	Nongstoin	Ri-Muliang	
1st Trimester	**6 (14.29%)**	**2 (4.76%)**	**1 (6.67%)**	**0**	-	-	-	-	**1 (3.35%)**
2st Trimester	**5 (11.90%)**	**10 (23.81%)**	**3 (20%)**	**3 (20%)**	**1 (16.67%)**	**3 (50%)**	-	-	**10 (34.48%)**
3st Trimester	**6 (14.29%)**	**13 (30.95%)**	**1 (6.67%)**	**7 (46.67%)**	**1 (16.67%)**	**1 (16.67%)**	**4 (50%)**	**4 (50%)**	**18 (62.07%)**
WKH (2 Blocks)	**42*(100%)**		**15(100%)**		**6(100%)**		**8(100%)**		**29(100%)**

Note: *In the present study it is found that out of 43 pregnant women one mother from Nongstoin block was not consulting any person (Govt. staff or private staff) during her pregnancy.

In the present study out of 42 pregnant mothers who are consulting health care 29 mothers received vaccination while 13 mothers were not vaccinated during their pregnancy with Ri-Muliang showing the highest number of vaccinated pregnant women with a total of 18 followed by Nongstoin block which is 11 pregnant mothers. In the present study 3.35% of the mothers have received 1st dose of vaccination during 1st trimester, 34.48% have received 2nd dose of vaccination, and 62.07% of pregnant mothers have received 3rd dose of vaccine in their 3rd trimester.

In the Nongstoin block it is found that out of 6 first trimester pregnant mothers only 1 mother received 1st dose of vaccination while the remaining 5 mother did not receive 1st dose. Out of 5 second trimester mothers, 3 received 1st dose and only 1 received 2nd dose of vaccination while 1 mother did not receive any doses. Out of 6 third trimester mothers 1 received 1st dose, 1 received 2nd dose, and 4 mothers received full dose of vaccination. This implies that although in the 1st and 2nd trimester vaccination is abrupt but in the 3rd trimester pregnant mothers become aware of vaccination hence maximum number of mother is seen to have received full vaccination.

In the Ri-Muliang block it is found that out of 2 first trimester pregnant mothers none of the mothers received 1st dose of vaccination. Out of 10 second trimester mothers, 3 received 1st dose and 3 received 2nd dose of vaccination while 4 mothers did not receive any doses. Out of 13 third trimester mothers, 7 received 1st dose, 1 received 2nd dose, and 4 mothers received full dose of vaccination while 1 mother did not receive any dose.

Cultural perceptions play an important role in the participation of pregnant mothers to vaccination among the Khasis in the studied area. It is believed that amongst them, pregnancy is a normal and natural part of a women's life and is not considered a physical ailment or shortcoming to continue normal activities which is often perceived by modern medicalpractitioners. Therefore, they believe that they do not need to take medicine during pregnancy which contributed to low participation of vaccination during pregnancy in the studied area.

Table 44: Pre-natal Food Practices

Received advice on Prenatal food practices	Nongstoin	Ri-Muliang	West Khasi Hills District (2 Blocks)
Yes	14(66.67%)	7(33.33%)	21(48.84%)
No	4(18.18%)	18(81.82%)	22(51.16%)
Total	18(41.86%)	25(58.14%)	43(100%)
Who advices you on food and diet	**Nongstoin**	**Ri-Muliang**	**West Khasi Hills District (2 Blocks)**
ASHA/Doctor	11(64.71%)	6(35.29%)	17(80.95%)
Elderly family	2(66.67%)	1(33.33%)	3(14.29%)

member/ASHA			
Untrained Birth attendant	1(100%)	0	1(4.76%)
Total	14(66.67%)	7(33.33%)	21*(100%)
Restricted food during pregnancy	**Nongstoin**	**Ri-Muliang**	**West Khasi Hills District (2 Blocks)**
Spicy food	1(50%)	1(50%)	2(4.65%)
Papaya	4(100%)	0	4(9.30%)
No restrictions	13(35.14%)	24(64.86%)	37(86.05%)
Total	18(41.86%)	25(58.14%)	43(100%)
Food prescribed during pregnancy period	**Nongstoin**	**Ri-Muliang**	**West Khasi Hills District (2 Blocks)**
Fruit/vegetables	7(53.85%)	6(46.15%)	13(30.23%)
Animal protein	1(50%)	1(50%)	2(4.66%)
No food prescribed	10(35.71%)	18(64.29%)	28(65.12%)
Total	8(18.60%)	7(16.28%)	43(100%)
Supplementary food for good health	**Nongstoin**	**Ri-Muliang**	**West Khasi Hills District (2 Blocks)**
Homemade	3(37.5%)	5(62.5%)	8(18.60%)
Commercialized	5(41.67%)	7(58.33%)	12(27.91%)
No food supplement	10(43.48%)	13(56.52%)	23(53.49%)
Total	14(39.53%)	25(58.14%)	43(100%)
Medical supplement	**Nongstoin**	**Ri-Muliang**	**West Khasi Hills District (2 Blocks)**
Calcium, Iron, Folic acid	5(55.56%)	4(44.44%)	9(20.93%)
Calcium, Iron, Folic acid, Vitamin	5(83.33%)	1(16.67%)	6(13.95%)
Calcium, Iron, Folic acid, Vitamin, Zinc, Omega 3 fatty acid	2(9.52%)	19(90.48%)	21(48.84%)
No medical supplement	6(85.71%)	1(14.28%)	7(16.28%)
Total	18(41.86%)	25(58.14%)	43(100%)

Note: * In the present study out of 43 studied pregnant women 21 mothers responded that they received advice on prenatal food practices.

In the present study out of 43 pregnant mothers it is found that 2 (48.84%) received advice on prenatal food practices while 22 pregnant mothers did not receive advice on prenatal food practices. Notably, it is found that out of 21 mothers who received advice on food practices

majority of the women belong to Nongstoin block which is 14 in total (66.67%) followed by Ri-muliang which is 7 (33.33%).

Based on the responses received from the pregnant mothers on received advice on food and diet the following three categories are: ASHA/Doctor, Elderly family member/ ASHA, and Untrained birth attendant. It is found that out 17 (80.95%) pregnant mothers received advice from ASHA/ Doctor, 3 (14.29%) received advice from Elderly family member and also from ASHA, and 1 (4.76%) received advice from Untrained birth attendant. It is found that majority of the mothers from the West Khasi Hills District received advice from ASHA and Doctor. Interestingly, 2 from Nongstoin block and 1 from Ri-Muliang block received advice from Elderly family member and also from ASHA and 1 from Nongstoin block received advice from Untrained birth attendant.

In the present study it is found that majority (86.05%) of the pregnant women did not practice any restriction on food during pregnancy with the highest number of pregnant 24 (64.86%) from Ri-Muliang block, followed by Nongstoin block 13 (35.14%). The study showed that the restriction of food on pregnant mothers is low with restrictions found only on spicy food and papaya during pregnancy. It is found that only 1 pregnant mother from Nongstoin block and 1 from Ri-Muliang block follow restriction on spicy food. It is found that a restriction on papaya is found only in Nongstoin block from the study.

The present study showed that when asked about the food prescribed during pregnancy period the highest number of pregnant mothers(65.12%) responded with no food prescribed during pregnancy, followed by prescription on food and vegetables (30.23%), and animal protein (4.66%).In the study it is found that majority of pregnant women (53.49%) responded with no food supplement with the highest number of women from Ri-Muliang block with a total of 13 (56.52%) followed by Nongstoin block with a total 10 (43.48%). It is found that 7 mothers from Ri-Muliang and 5 from Nongstoin block take commercialized food such as horlicks, fortified food, eggs, and toned milk. It is also found that 5 mother from Ri-Muliang block and 3 from Nongstoin block take home made food such as soup, local rice, and fruit juice. When asked about taking of medical supplement from the pregnant mothers, total of 9 (20.93%) pregnant women were found to take Calcium, Iron, and Folic acid; 6 (13.95%)pregnant women take Calcium, Iron, Folic acid, and Vitamin; 21 (48.84%) pregnant women take Calcium, Iron, Folic acid, Vitamin, and Zinc, Omega 3 fatty acid. It is found that taking of Calcium, Iron, Folic acid, Vitamin, and Zinc, Omega 3 fatty acid is found majorly in Ri-Muliang block showing total of 19 (90.48%) and less on Nongstoin block showing total 2 (9.52%). The study shows that a total of 7 (16.28%) from West Khasi Hills District were not taking any medical supplement, showing 6 from Nongstoin block (85.7%) and 1 from Ri-Muliang block (14.28%).

Table 45: Auxiliary Pre-Natal Health-Care Practices

Exercise/Activities	Nongstoin	Ri-Muliang	West Khasi Hills

			District (2 Blocks)
Yes	11(52.38%)	10(47.62%)	21(48.84%)
No	7(31.82%)	15(68.18%)	22(51.16%)
Total	18(41.86%)	25(58.14%)	43(100%)

In the present study it is found that 21 (48.84%) pregnant mothers received advice on exercise/activities while 22 (51.16%) pregnant did not receive advice on exercise/ activities.In the study exercises/activities is referred to as normal daily activities and walking advised to pregnant mothers. It is found that 10 (47.62%) pregnant mothers were found doing normal activities, with Ri-Muliang showing higher frequency (8) and less from Nongstoin (2). 5 (23.81%) were found to do walking during pregnancy, and 6 (28.57%) were found doing normal activities as well as walking.

In the study when asked if they are advised to take rest during pregnancy 22 (51.16%) pregnant mothers responded yes and 21 (48.84%) responded no from West Khasi Hills District. It is found that among the mothers who were advised to take rest were more in Ri-Muliang block showing 13 mothers followed by 3 mothers from Nongstoin block.

From the study it is found that among the 22 pregnant mothers who were advised to take rest during pregnancy was found due to the following complications: Headache; Late pregnancy; Nausea, Vomiting; Nausea, Backpain; Tiredness; High blood pressure; Gestational diabetes; and Multiple Complications. The study showed that nausea and vomiting occurred in higher frequency (45.45%) followed by tiredness (22.73%). It is found that nausea and vomiting occurred more among the mothers in Ri-Muliang block (6 mothers) followed by Nongstoin block (4 mothers). The occurrence of tiredness was found more in Ri-Muliang block showing 4 mothers (80%) and only 1 (20%) mother from Nongstoin block.

Additionally, it is observed that post-partum mothers were engaged in managing daily chores such as cleaning the house, cooking, washing, etc. In Ri-Muliang block a mother who had a new born baby said that she manages all the works in her house including taking care of all her juvenile children when her husband goes out for work which is also observed from the neat and tidy surrounding in her house.

Table 46: Age Group Wise Haemoglobin category of Pregnant Women (WHO, 1968)

	Nongstoin					Ri - Muliang					
Age Group	Normal (11 orhigher)	Mild Anaemia (10.0-10.9)	Moderate Anaemia (7.0-9.9)	Severe Anaemia (lower than 7.0)	Total	Age group	Normal (11 or higher)	Mild Anaemia (10.0-10.9)	Moderate Anaemia (7.0-9.9)	Severe Anaemia (lower than 7.0)	Total
17 – 27	4 (21.05%)	2 (10.52%)	4 (21.05%)	0	10 (52.63%)	**17 – 27**	6 (25%)	1 (4.16%)	3 (12.5%)	0	10 (41.66%)
28 – 38	4 (21.05%)	1 (5.26%)	3 (15.78%)	1 (5.26%)	9 (47.37%)	**28 – 38**	4 (16.66%)	0 (0.00%)	8 (33.33%)	0	12 (50%)
39 – 49	0	0	0	0	0	**39 – 49**	0	1 (4.16%)	1 (4.16%)	0	2 (8.34%)
Total	8 (42.10%)	3 (15.78%)	7 (3.68%)	1 (5.26%)	19 (100%)	**Total**	10 (41.66%)	2 (8.33%)	12 (50%)	0	24 (100%)

N.B. Total women = 351, Total pregnant women = 43 (19+24)

The table represents the age group wise distribution of pregnant women on the basis of their haemoglobin category. The pregnant women were divided into three age groups as 17 – 27 years, 28 – 38 years and 39 – 49 years respectively and they were categorized as normal , mild, moderate or severe anaemic on the basis of their heamoglobin level. There are a total of 19 pregnant women and 24 pregnant women from Nongstoin and Ri – Muliang block respectively. From the table it is evident that highest frequency of mothers i.e., 7 (3.68%) from Nongstoin block and 12 (50%) from Ri – Muliang block are moderately anaemic showing the higher occurrences ofwomen under the age group of 17 – 27 years from Nongstoin block and 28 – 38 years from Ri – Muliang block. Also only 1(5.26%) mother under the age group of 28 – 38 years was found to be severely anaemic but none was reported from the Ri – Muliang block.

Section B

Lactating Mothers of Khasi Community of West Khasi Hills

The following are the analysis, discussion, and observation made on lactating mothers in the studied area Nongstoin and Ri-Muliang block.

Table 47: Duration of breast-feeding practice among lactating mothers

Place	Age group (Months)					
	0-6	**7-12**	**13-18**	**19-24**	**25-30**	Total
Nongstoin	25(42.37%)	17(44.74%)	13(54.17%)	7(58.33%)	1(50%)	63(46.67%)
Ri-Muliang	34(57.63%)	21(55.26%)	11(45.83%)	5(41.67%)	1(50%)	72(53.33%)
West Khasi Hills District (2 Blocks)	59(43.70%)	38(28.15%)	24(17.78%)	12(8.89%)	2(1.48%)	**135(100%)**

In the present study a total of 135 lactating mother from both Nongstoin and Ri-Muliang block of West Khasi Hills District were considered. The study found that 72 (53.33%) lactating mothers were from Ri-Muliang block while 63 (46.67%) mothers were found from Nongstoin block. In both the blocks, the duration of breast feeding from age group 0-6 months were highest showing 43.70% followed by 7-12 months (28.15%), 13-18 months (8.89%), and 19-24 (8.89%). Long duration of breast feeding for 25-30 months was noticed among 2 mothers only, 1 mother from each block.

Table 48: Distribution of the children underexclusive Breast Feeding (up to 6 months)

Area	Total
Nongstoin	23(42.59%)
Ri-Muliang	31(57.41%)
West Khasi Hills District (2 Blocks)	54*(100%)

Note: In the present study out of total 59 children between the age group 0-6 it is found that only 54 children were found exclusive breast feed.

The present study found that a total of 54 children of 0-6 months were exclusive breast feed. It is found that Ri-Muliang block showed a maximum number of exclusive breast-feeding children with a total of 31 children (57.41%) followed by Nongstoin block showing a total of 23 (42.59%)children.

Table 49: Initiation of breast-feeding practice among lactating mothers

Initiation of Breast Feeding	Nongstoin	Ri-Muliang	West Khasi Hills District (2 Blocks)
Immediately after birth	58(92.06%)	67(93.05%)	125(92.59%)
After 24 hours of birth	3(4.76%)	4(5.55%)	7(5.18%)
A few days after birth	2(3.17%)	1(1.39%)	3(2.22%)
Total	63(46.67%)	72(53.33%)	**135(100%)**

In the present study based on the initiation of breast feeding the following are the categories: Immediately after birth; After 24 hours of birth; and A few days after birth. It is found that a maximum number of children were breast feed immediately after birth showing a total of 125 (92.59%) with Ri-Muliang showing the highest number with a total of 67 followed by Nongstoin block with a total of 58 (92.06%). It is found that 7 children (5.18%) were breast feed after 24 hours of birth and 3 (2.22%) of children were given breast feeding a few days after birth which was mainly due to inability of mother to produce milk immediately after birth.

Table 50: Colostrum feeding practice among lactating mothers

Feeding of Colostrums	Nongstoin	Ri-Muliang	West Khasi Hills District (2 Blocks)
Yes	62(98.41%)	71(98.61%)	133(98.52%)
No	1(1.59%)	1(1.38%)	2(1.48%)
Total	63(46.67%)	72(53.33%)	**135(100%)**

In the present study it is found that maximum number of children from the West Khasi Hills District were given colostrum showing a total of 133 (98.52%) with Ri-Muliang showing highest number (71 children) followed by Nongstoin (62 children). The study showed that 2 children (1 from Nongstoin and 1 from Ri-Muliang) were not given colostrums immediately after birth. It is found that 1 mother from Nongstoin did not produce breast milk immediately after birth therefore the baby was not given colostrum, while 1 mother from Ri-Muliang was forbidden by husband and mother to give colostrums to the baby.

Table 51: Use of medicine supplement during lactation period

Providing of medicine supplement	Nongstoin	Ri-Muliang	West Khasi Hills District (2 Blocks)

Yes	29(46.03%)	27(37.50%)	56(41.48%)
No	34(53.97%)	45(62.50%)	79(58.52%)
Total	63(46.67%)	72(53.33%)	**135(100%)**

In the present study when asked about providing of medicine supplement during lactating period to the lactating mothers it is found that 56 (41.48%) lactating mothers responded yes to providing of medicine supplement while 79 (58.52%) mothers responded no to providing of medicine supplement during lactation period. Out of the responses from both the blocks, it is found that Nongstoin block was found maximum with a total 29 followed by Ri-Muliang having a total 27 in providing of medicine supplement to children. It is found that 45 from Ri-Muliang block and 34 from Nongstoin block do not provide medicine supplement to their children during lactation period.

Table 52: Use of food Supplement among lactating mothers and their consultants

Consulting Person	Nongstoin			Ri-Muliang			West Khasi Hills District (2 Blocks)		
	Homemade	Commercialized	Traditional	Homemade	Commercialized	Traditional	Homemade	Commercialized	Traditional
ASHA/ Doctor	0	23 (82.14%)	0	0	6 (66.67%)	0	0	29 (76.32%)	0
Untrained Birth Attendant	1 (100%)	2 (7.14%)	0	0	0	0	1 (50%)	2 (5.26%)	0
Elderly Family Member	0	2 (7.14%)	0	1 (100%)	0	1 (5.88%)	1 (50%)	3 (7.89%)	0
Traditional Healer	0	0	0	0	2 (22.22%)	16 (94.12%)	0	2 (5.26%)	16 (100%)
Self	0	1 (3.57%)	0	0	1 (11.11%)	0	0	2 (5.26%)	0
Total	1 (100%)	28 (100%)	0	1 (100%)	9 (100%)	17 (100%)	2 (100%)	38 (100%)	16 (100%)

In the present study it is found that out of total 56 lactating mothers who provide medicine supplement during lactation it is found that maximum number of lactating mothers give commercialized type of supplement showing a total number of 38 followed by traditional (*Dwai Niang Sophet*) showing a total of 16, while only 2 were found to give homemade supplement to children.

A marked difference in the use of food supplement is observed between the blocks located near to the headquarter and farther from the head quarter in the study. Interestingly when compared between the two blocks of West Khasi Hills District it is found that in the Nongstoin block which is situated nearest to the headquarter, the highest number of lactating mother uses commercialized supplement for their children with a total of 28 while only 1 homemade supplement consumption was found. Notably no use

traditional supplement (*Dwai Niang Sophet*) was reported from Nongstoin block. In the Ri-Muliang block which is farthest from the headquarter the use of traditional supplement (*Dwai Niang Sophet*) was found highest having a total of 17, followed by commercialized showing a total of 9, and only 1 homemade supplement.

In the present study when asked about the consulting person for the medicine supplement during lactating period, it is found that the commercialized supplement during lactation period in the Nongstoin block showed a highest frequency, a of total 23 (82.14%) which is found to be recommended by ASHA/Doctor, followed by 2 (7.14%) from untrained birth attendant, 2 (7.14%) from elderly family members, and 1 (3.57%) which is self-consulted. While only 1 homemade supplement was recommended by untrained birth attendant. On the other hand, in the Ri-Muliang block traditional (*Dwai Niang Sophet*) supplement showed the highest frequency of total 16 (94.12%) which was found to have recommended by traditional healer while only 1 (5.88%) was recommended by elderly family member. In the Ri-Muliang block commercialized supplements was recommended by ASHA/Doctor showing total 6 (66.67%), followed by 2 (22.22%) traditional healer, and 1 (11.11%) self-consulted.

Table 53: Frequency of breast feed

Frequency	Age Group (In Months)										Total
	0-6 Months		7-12 Months		13-18 Months		19-24 Months		25-30 Months		Total
	Nongstoin	Ri-Muliang	Nongstoin	Ri-Muliang	Nongstoin	Ri-Muliang	Nongstoin	Ri-Muliang	Nongstoin	Ri-Muliang	West Khasi Hills
Every 1Hrs	3 (50%)	3 (50%)	-	-	-	-	-	-	-	-	6 (4.48%)
Every 2Hrs	17 (58.62%)	5 (17.24%)	3 (10.34%)	1 (3.45%)	1 (3.45%)	-	1 (3.45%)	1 (3.35%)	-	-	29 (21.64%)
Every 3Hrs	-	2 (18.18%)	2 (18.18%)	3 (27.27%)	4 (36.36%)	-	-	-	-	-	11 (8.21%)
Every 4Hrs	-	-	1 (9.09%)	-	3 (27.27%)	-	1 (9.09%)	-	-	-	5 (3.73%)
Whenever baby cries	4 (5.06%)	24 (30.38%)	10 (12.66%)	17 (21.52%)	5 (6.33%)	11 (13.92%)	3 (3.80%)	4 (5.06%)	-	1 (1.27%)	79 (58.96%)
Only Night time	-	-	-	-	-	-	2 (66.67%)	-	1 (33.33%)	-	3 (2.24%)
Morning and evening	-	-	1 (100%)	-	-	-	-	-	-	-	1 (0.75%)
Total	24 (17.91%)	34 (25.37%)	17 (12.69%)	21 (15.67%)	13 (9.70%)	11 (8.21%)	7 (5.22%)	5 (3.73%)	1 (0.75%)	1 (0.75%)	134[1] (100%)

1- One mother is not having breast milk from Nongstoin block.

In the present study based on the frequency of breastfeeding behavior the following categories are: Every 1 Hour; Every 2 Hour; Every 3 Hour; Every 4 Hour; Whenever Baby Cries; Only Night Time; Morning and Evening. The study showed that in the West Khasi Hills District the highest number of lactating mother breast feed their children whenever baby cries (58.96%) which is followed by breast feeding every 2 hour (21.64%). In the study, 1 mother from Nongstoin block was not found breast feeding her child as she was not having breast milk. Traditionally when the mother is not able to produce milk after birth they consult a traditional healer for massage and take a herbal medicine given by the traditional healer.

It is found that in the age group 0-6 months only 3 mothers from Nongstoin block and 3 mothers from Ri-Muliang block were found to breast feed their children every 1 hour. In the Nongstoin block between the age group (0-6) maximum number of lactating mothers were found to breast feed their children every 2 hours (58.62%) while, in the Ri-Muliang block the maximum number of lactating mothers were found to breast feed whenever baby cries (30.38%) between the age group (0-6). In the study it is found that 1 mother from Nongstoin block gives breast milk to her child only morning and evening.

In the present study on the West Khasi Hills District, it is found that between the age groups of 7-12, 13-18, and 19-24 months maximum number of women were found breast feeding their babies whenever they cries. In the age group of 25-30 months, 1 mother from Ri – Muliang block was found breast feeding her baby whenever the baby cries.

Table 54: Occupation wise distribution of the lactating mothers regarding the desired duration of breast feeding of the baby (age in months)

Occupation	Duration of breast feeding									
	6 Months		12 Months		18 Months		As long as the baby wants		Cannot Say	
	Nongstoin	Ri-Muliang	Nongstoin	Ri-Muliang	Nongstoin	Ri-Muliang	Nongstoin	Ri-Muliang	Nongstoin	Ri-Muliang
AGL/DWL/Farmer	2 (15.38%)	1 (100%)	0	2 (33.33%)	1 (9.09%)	16 (80%)	4 (19.05%)	25 (78.12%)	2 (13.33%)	9 (69.23%)
Housewife	7 (53.85%)	0	2 (100%)	4 (66.67%)	8 (72.73%)	3 (15%)	12 (57.14%)	5 (15.63%)	10 (66.67%)	3 (23.08%)
Business	0	0	0	0	0	1 (5%)	0	1 (3.13%)	1 (6.67%)	0
Service	4 (30.77%)	0	0	0	2 (18.18%)	0	5 (23.81%)	1 (3.13%)	2 (13.33%)	1 (7.69%)
Total	13 (100%)	1 (100%)	2 (100%)	6 (100%)	11 (100%)	20 (100%)	21 (100%)	32 (100%)	15 (100%)	13 (100%)
West Khasi Hills District (2 Blocks)	14 (10.45%)		8 (5.97%)		31 (23.13%)		53 (39.55%)		28 (20.90%)	

Note: AGL – Agricultural Labourer. DWL – Daily Wage Labourer

The present study showed that when asked about the opinions on the desired age of breast feeding of the baby to the lactating mothers the response as long as the baby wants was found to be the highest among the mothers showing a total of 53 mothers which was followed by 18 months showing 31 mothers, and cannot say showing 28 mothers.

Interestingly, when a comparison was made between the opinions on the desired age of breast feeding of the baby and the occupation of the breast-feeding mothers, marked contrasts was found between Nongstoin block and Ri-Muliang block of West Khasi Hills.

The study found that in the Ri-Muliang block maximum number i.e., 25 mothers (78.12%) belonging to AGL/ DWL/Farmer category desired to breast feed their children for a duration as long as the baby wants despite of their occupational limitations, followed by 16 mothers (80%) who desired to breast feed their children for 18 months in the same block. The study showed that occupation of the mothers and desired age of breast feeding does not affect the breast-feeding duration in Ri-Muliang block.

However, in the Nongstoin block maximum mother i.e.,12 mothers (57.14%) belonging to housewife category desired to breast feed their children showing maximum frequency in the group as long as the baby wants, followed by 8 mothers (72.73%) who desired to breast feed for 18 months. Notably, it is also seen that 7 mothers (53.85%) belonging to housewife category in Nongstoin block responded to breast feed their children for duration of 6 months.

Table 55: Breast feeding Behavior among lactating mothers

Cleaning of baby after breast feeding	Nongstoin	Ri-Muliang	West Khasi Hills District (2 Blocks)
Always after feeding	33(53.23%)	46(63.89%)	79(58.95%)
Some convenient time after feeding	24(38.71%)	25(34.72%)	49(36.57%)
Never	5(8.06%)	1(1.39%)	6(4.48%)
Total	62(46.27%)	72(53.73%)	134[1](100%)
Preferable position to breast feed the baby	**Nongstoin**	**Ri-Muliang**	**West Khasi Hills District (2 Blocks)**
Sitting	17(27.42%)	38(52.78%)	55(41.05%)
Lying	9(14.52%)	3(4.17%)	12(8.95%)
Both sitting and lying	36(58.06%)	31(43.05%)	67(50%)
Total	62(46.27%)	72(53.73%)	134[1](100%)
Mothers opinion of sufficiency of breast milk to the daily demand of the baby	**Nongstoin**	**Ri-Muliang**	**West Khasi Hills District (2 Blocks)**
Yes	33(53.23%)	45(62.50%)	78(58.21%)
No	28(45.16%)	27(37.5%)	55(41.04%)
Cannot say	1(1.61%)	0	1(0.75%)
Total	62(46.27%)	72(53.73%)	134[1](100%)

1 one mother is not having breast milk from Nongstoin block.

In the present study when breast feeding behavior is studied among the lactating mothers it is found that the maximum numbers of mothers of West Khasi Hills District were found cleaning

the baby after breast feeding (58.95%), followed by mothers who cleans at some convenient time after feeding (36.57%). Only 5 mothers from Nongstoin block and 1 from Ri-Muliang block do not clean the baby after breast feeding.

From the study it is found that in the West Khasi Hills District 50% of lactating mothers prefer to breast feed their children in both sitting and lying position, followed by 41.05% of mothers who prefers sitting position. It is found that only 8.95% of mothers prefer lying position while breast feeding.

In the study, when asked about the sufficiency of breast milk to the daily demand of the baby 58.21% of mothers responded yes while 41.04% responded no. It is found that only 1 mother from Nongstoin block responded cannot say and 1 mother from the same block was found not having breast milk.

Table 56: Food practices among the lactating mothers

Special Food in daily diet to enhance milk production	Nongstoin	Ri-Muliang	West Khasi Hills District (2 Blocks)
Yes	10(15.87%)	9(12.50%)	19(14.07%)
No	53(84.13%)	63(87.50%)	116(85.93%)
Total	63(46.67%)	72(53.33%)	135(100%)
Medicine Supplement other than daily diets	**Nongstoin**	**Ri-Muliang**	**West Khasi Hills District (2 Blocks)**
Yes	27(42.86%)	53(73.61%)	80(59.26%)
No	36(57.14%)	19(26.39%)	55(40.74%)
Total	63(46.67%)	72(53.33%)	135(100%)
Beneficiary of Supplementary Nutritional Programme	**Nongstoin**	**Ri-Muliang**	**West Khasi Hills District (2 Blocks)**
Yes	45 (71.43%)	17 (23.61%)	62 (45.92%)
No	18(28.57%)	55(76.39%)	83(61.48%)
Total	63(46.67%)	72(53.33%)	135(100%)

In the present study it is found that the highest number of mothers (85.93%) does not take any special food in daily diet to enhance milk production. The study shows that only 19 (14.07%) mothers were found to take special food in their daily diet. In the study the special food taken by lactating mothers are horlicks, beef soup, green vegetables, local rice soup, and chicken soup in the West Khasi Hills.

The maximum number (73.61%) of mothers from Ri-Muliang block were found to take supplementary medicine while in the Nongstoin block only 42.86% were found to take supplementary medicine. The supplementary medicine taken by the breast-feeding mothers

includes calcium, iron, folic acid, vitamin B12, Vitamin D and Zinc (in Ri-Muliang). The study found that in the Nongstoin block the supplement medicine was mostly advised by ASHA and Doctor while in the Ri-Muliang block it is mostly advised by ASHA worker and elderly family member. The study showed that 61.48% of lactating mothers were not receiving beneficiary of supplementary nutritional programme while 45.92% of lactating mothers were beneficiary of supplementary nutritional programme.

Table 57: Place of delivery of the studied children of Nongstoin and Ri – Muliang block

Place of delivery	Nongstoin	Ri - Muliang	West Khasi Hills (2 blocks)
Government Hospital	74(29.25%)	91 (35.97%)	165 (65.22%)
Community Health Centre	1(0.40%)	1 (0.40%)	2 (0.79%)
Primary Health Centre	0 (0.00%)	7 (2.76%)	7 (2.76%)
Sub-centre	0 (0.00%)	1 (0.40%)	1 (0.40%)
Private Hospital	12(4.74%)	3(1.19%)	15 (5.93%)
Home	28(11.07%)	35 (13.83%)	63 (24.90%)
Total	115(45.45%)	138 (54.55%)	253 (100%)

The table presented here examines the place of delivery for 253 children from the Nongstoin and Ri-Muliang blocks of West Khasi Hills, with 115 children from Nongstoin and 138 from Ri-Muliang. The places of delivery have been categorized into the following: government hospital, community health centre (CHC), primary health centre (PHC), sub-centre, private hospital, and home.The highest proportion of children (65.22%) from both blocks were born in a government hospital, with 29.25% of children from Nongstoin and 35.97% from Ri-Muliang being delivered there. The second most common place of delivery was at home, accounting for 24.90% of births. Notably, Ri-Muliang exhibited a higher frequency of home births (13.83%) compared to Nongstoin (11.07%).

Table 58: Birth weight of the studied children of Nongstoin and Ri – Muliang block

Birth weight (in kg)	Nongstoin	Ri - Muliang	West Khasi Hills (2 blocks)
1 – 2.0	1(0.40%)	6 (2.37%)	7 (2.77%)
2.1 – 3.0	36(14.23%)	54 (21.34%)	90 (35.55%)
3.1 – 4.0	71(28.06%)	73 (28.85%)	144 (56.92%)

4.1 – 5.0	4(1.58%)	1 (0.40%)	5 (1.98%)
Didn't measure	3(1.19%)	2 (0.79%)	5 (1.98%)
Don't remember	0 (0.00%)	2 (0.79%)	2 (0.79%)
Total	115(45.45%)	138 (54.55%)	253 (100%)

The table presents the birth weight distribution of children studied in the Nongstoin and Ri-Muliang blocks of West Khasi Hills. The majority of children (56.92%) were born with a birth weight between 3.1 and 4.0 kg, followed by those with a weight between 2.1 and 3.0 kg (35.55%). Among the 144 children in the 3.1 – 4.0 kg weight category, both blocks showed almost equal distribution. However, Ri-Muliang block had a higher proportion (21.34%) of children born with a weight between 2.1 and 3.0 kg compared to Nongstoin (14.23%).

A small percentage of children (2.77%) were classified as having low birth weight, with 6 out of the 7 low birth weight cases reported from Ri-Muliang block. Additionally, 7 children from both blocks were reported with unmeasured birth weights, either because the weight was not recorded or the mother could not recall it.

Section C

Child feeding practices (children up to 3 years of age) of the Khasi Community of West Khasi Hills.

Table 59: Food and Dietary Practices of the studied children of Nongstoin and Ri –Muliang block

Daily Diet			
Daily diet	Nongstoin	Ri - Muliang	West Khasi Hills (2 blocks)
Exclusive breast feeding	25(9.88%)	35 (13.83%)	60 (23.72%)
Composite feeding	32(12.65%)	40 (15.81%)	72 (28.45%)
Milk supplement	2(0.79%)	0	2 (0.79%)
Normal adult diet	56(22.13%)	63 (24.90%)	119(47.04%)
Total	115 (45.45%)	138(54.55%)	253 (100%)
Frequency of having breast milk (per day) in case of Exclusive Breast Feeding			
Frequency (in hours)	Nongstoin	Ri - Muliang	West Khasi Hills (2 blocks)
1 hour	2(3.33%)	5 (8.33%)	7 (11.66%)
2 hours	19(31.67%)	5 (8.33%)	24 (40.00%)
3 hours	3(5.00%)	2 (3.33%)	5 (8.33%)
4 hours	1(1.67%)	0	1 (1.67%)

5 hours	0	1 (1.67%)	1(1.67%)
Whenever the child wants	0	22(30.00%)	22(36.66%)
Total	25 (41.67%)	35 (58.33%)	60(100%)

Age at which the composite diet is introduced to children

Month at which semi – solid food was introduced	Nongstoin	Ri - Muliang	West Khasi Hills (2 blocks)
0 – 5 months	13(18.05%)	3 (4.17%)	16 (22.22%)
6 – 10 months	18(25.00%)	34 (47.22%)	52 (72.22%)
11 months and above	1(1.39%)	3 (4.17%)	4 (5.56%)
Total	32(44.44%)	40 (55.56%)	72 (100%)

Type of Semi Solid Food in CompositeDiet

Type of foods	Nongstoin	Ri - Muliang	West Khasi Hills (2 blocks)
Commercialized	4 (5.56%)	2 (2.78%)	6 (8.33%)
Home made	25 (34.72%)	33 (45.83%)	58 (80.56%)
Commercialized+ Home made	3 (4.17%)	5 (6.94%)	8 (11.11%)
Total	32(44.44%)	40(55.56%)	72(100%)

The Frequency of having semi – solid food (Composite Diet)

Frequency (per day)	Nongstoin	Ri - Muliang	West Khasi Hills (2 blocks)
2 times	12(16.67%)	14 (19.44%)	26 (36.11%)
3 times	19(26.39%)	24 (33.33%)	43 (59.72%)
4 – 5 times	1(1.39%)	2 (2.78%)	3 (4.17%)
Total	32(44.44%)	40 (55.56%)	72 (100%)

Age of Discontinuation of Breastfeeding Among Children(Normal Adult Diet)

Age of discontinued breastfeeding (months)	Nongstoin	Ri - Muliang	West Khasi Hills (2 blocks)
Never breastfed	0	2 (1.68%)	2 (1.68%)
0 – 5 months	1 (0.84%)	1 (0.84%)	2 (1.68%)
6 – 10 months	21(17.65%)	13 (10.92%)	34 (28.57%)
11 months and above	34 (28.57%)	47 (39.50%)	81(68.07%)
Total	56(47.06%)	63 (52.94%)	119(100%)

Supplementary Feeding Practices Among Children

Food supplements	Nongstoin	Ri - Muliang	West Khasi Hills (2 blocks)
Commercialized	23 (9.09%)	15 (5.93%)	38(15.03%)

tinned milk			
Homemade	33(13.04%)	26 (10.28%)	59 (23.30%)
Commercialized + Homemade	6(2.37%)	2 (0.79%)	8 (3.17%)
No food supplements	53(20.95%)	95 (37.55%)	148 (58.50%)
Total	115(45.45%)	138 (54.55%)	253 (100%)
Medicinal Supplementation Among Children			
Medicine supplements	**Nongstoin**	**Ri - Muliang**	**West Khasi Hills (2 blocks)**
Yes	85(33.60%)	92 (36.36%)	177(69.96%)
No	30(11.86%)	46 (18.18%)	76(30.04%)
Total	115 (45.45%)	138(54.55%)	253(100%)

The table presents data on the food and dietary practices of children up to three years old in Nongstoin and Ri-Muliang blocks of West Khasi Hills.

The data indicate that 23.72% of the studied children were exclusively breastfed. A notable difference was observed between the two blocks, with Ri-Muliang showing a higher prevalence (13.83%) compared to Nongstoin (9.88%). This variation could be influenced by factors such as maternal education, cultural beliefs, healthcare accessibility, or economic conditions that affect breastfeeding practices.A significant proportion (47.04%) of children had transitioned to a normal adult diet. This trend was more pronounced in Ri-Muliang (24.90%) than in Nongstoin (22.15%). The higher percentage of children on an adult diet suggests early introduction to family meals, possibly due to food availability, parental feeding habits, or the need for mothers to resume work, making exclusive breastfeeding or separate meal preparation less feasible.Additionally, 28.45% of children followed a composite diet, consisting of both breast milk and semi-solid food. This dietary pattern indicates a transitional phase, where infants receive supplementary nutrition alongside breast milk to meet their growing energy and nutrient demands. Such a feeding approach aligns with standard infant feeding recommendations, ensuring adequate nourishment during early childhood development.Interestingly, only two children from the Nongstoin block were reported to consume commercial milk supplements. This minimal usage suggests that traditional feeding practices, such as breastfeeding and home-prepared meals, remain the predominant choice among families in both blocks. The limited adoption of commercial milk supplements may be attributed to economic constraints, lack of awareness, or a preference for natural feeding methods.

Regarding the frequency of breastfeeding among exclusively breastfed children, a total of 60 children from both blocks were considered (Nongstoin = 25, Ri-Muliang = 35).Among them, the highest proportion (40%) received breast milk every two hours, indicating a structured feeding pattern. Additionally, 36.66% of children were breastfed on demand, meaning they were fed whenever they needed. Interestingly, all children in this category belonged to the Ri-Muliang

block, suggesting a more flexible and responsive feeding approach in this region.Furthermore, 11.66% of children were breastfed every hour, with a higher occurrence in Ri-Muliang (8.33%) compared to Nongstoin. This frequent feeding pattern may indicate greater reliance on breast milk as the primary source of nutrition in some households. The variation in breastfeeding frequency between the two blocks highlights potential differences in caregiving practices, maternal availability, and cultural or lifestyle influences.

The tableanalyzed the age at which a composite diet (breast milk along with semi-solid food) was introduced among 72 children from Nongstoin (32 children) and Ri-Muliang (40 children). The findings reveal distinct trends in early feeding practices across the two regions.A total of 16 children (22.22%) across both blocks were introduced to a composite diet between 0-5 months of age. Notably, a higher percentage of children from Nongstoin (18.05%) started consuming semi-solid food alongside breast milk at this early stage compared to Ri-Muliang. The early introduction of complementary foods might be influenced by maternal workload, lack of awareness about exclusive breastfeeding recommendations, or cultural feeding norms. While early supplementation may help in cases where breast milk supply is insufficient, it may also pose risks such as digestive issues and increased susceptibility to infections if not managed properly.The majority of children (72.22%) began their composite diet between 6-10 months, aligning with global infant feeding recommendations. Among them, Ri-Muliang had a higher proportion (47.22%) compared to Nongstoin. This suggests that families in Ri-Muliang might be following more structured weaning practices, gradually introducing semi-solid foods at an appropriate age to support the child's nutritional needs while continuing breastfeeding. The introduction of complementary foods at this stage is crucial for ensuring adequate energy intake and developmental growth.Only a small percentage of children (5.56%) started a composite diet at 11 months or later. Among them, Ri-Muliang accounted for 4.17%, indicating a slightly delayed introduction of complementary foods in some cases. Delayed introduction beyond 10 months might be due to prolonged exclusive breastfeeding, limited awareness of complementary feeding requirements, or economic constraints affecting food availability. While breast milk continues to provide essential nutrients, delayed weaning could impact the child's ability to adapt to solid foods and meet increasing nutritional demands.

The study examined the types of semi-solid food included in the composite diet of 72 children from Nongstoin (32 children) and Ri-Muliang (40 children). The overall analysis highlights the preference for homemade over commercialized food among families in both regions.Among the studied children, only six (8.33%) were completely dependent on commercialized semi-solid food, with a higher proportion in Nongstoin (4 children) compared to Ri-Muliang (2 children). Commercialized semi-solid foods, such as packaged baby cereals, are often marketed for their convenience and nutritional composition. However, limited access, affordability issues, and a preference for traditional feeding practices may have contributed to their low usage in these rural communities.A small proportion of children (11.11%) consumed a mix of both commercialized and homemade semi-solid food, with 3 children from Nongstoin and 5 from Ri-Muliang. This

feeding pattern suggests that while some families incorporated commercial baby foods for convenience or supplementation, they still relied on homemade preparations as the primary source of nutrition. Factors such as maternal education, economic status, and exposure to commercial baby food products may have influenced this feeding choice.The majority of children (80.56%) were exclusively dependent on homemade semi-solid food in their composite diet. This trend reflects a strong preference for traditional, locally prepared foods over commercially available options. Homemade semi-solid foods, such as mashed rice, lentils, vegetables, and locally sourced porridges, are commonly introduced as complementary foods in these communities. These foods are often perceived as healthier, more affordable, and culturally appropriate, aligning with family dietary habits and available resources.

The study further analyzed the frequency of semi-solid food intake among 72 children from Nongstoin (32 children) and Ri-Muliang (40 children) to understand the dietary patterns in complementary feeding. The findings indicate variations in feeding frequency between the two blocks, which may be influenced by factors such as parental knowledge, food availability, and cultural practices. The highest proportion of children (59.22%) consumed semi-solid food three times a day, following a structured feeding routine. Among them, a higher frequency was observed in Ri-Muliang (33.33%) compared to Nongstoin (26.39%). This pattern aligns with recommended complementary feeding guidelines, where introducing semi-solid food in regular meal intervals helps meet the child's increasing nutritional needs. The prevalence of thrice-daily feeding suggests that many caregivers in these communities recognize the importance of structured meal timing for their children's growth and development.A considerable proportion (36.11%) of children were given semi-solid food twice a day, again following the trend of higher frequency in Ri-Muliang (19.44%) than in Nongstoin (16.67%). While twice-daily feeding provides some nutritional supplementation, it may not be sufficient for children's optimal growth, especially as they transition from exclusive breastfeeding to solid foods. The reasons for this feeding frequency could include maternal workload, food accessibility, or traditional feeding practices that emphasize continued breastfeeding alongside fewer solid meals.Only a small number of children (4.17%) consumed semi-solid food 4-5 times a day, with two children from Ri-Muliang and one from Nongstoin. A higher frequency of semi-solid food intake suggests greater emphasis on ensuring adequate energy and nutrient intake, possibly in households where children had higher nutritional demands or reduced breast milk consumption. However, this practice remains uncommon, indicating that most caregivers follow a meal-based feeding pattern rather than offering frequent small portions throughout the day.

The present study examined the age at which breastfeeding was discontinued among 119 children who had transitioned to a normal adult diet. The sample included 56 children from Nongstoin and 63 from Ri-Muliang, providing insights into variations in weaning practices between the two blocks.A majority of children (68.07%) discontinued breastfeeding at 11 months or later, aligning with the recommended duration for extended breastfeeding. Among them, 39.05% were from Ri-Muliang, while 28.57% were from Nongstoin. The higher

percentage in Ri-Muliang suggests that caregivers in this region may prioritize prolonged breastfeeding, possibly due to cultural beliefs, awareness of its health benefits, or limited access to alternative nutrition sources.Extended breastfeeding can be beneficial for child immunity and overall development, particularly in resource-limited settings where supplementary nutrition may not always be optimal.A significant proportion (28.57%) of children stopped breastfeeding between 6-10 months. Interestingly, Nongstoin had a higher percentage (17.65%) of early weaning compared to Ri-Muliang (10.92%). The earlier cessation of breastfeeding in Nongstoin might be influenced by maternal employment, early introduction of solid foods, or socio-economic factors that necessitate a shift to other dietary sources. While complementary feeding typically begins around six months, discontinuing breastfeeding too early may deprive infants of essential immune-boosting and nutritional benefits.Only two children (1.68%)—one from each block—discontinued breastfeeding as early as 0-5 months. Such early cessation is uncommon and could be due to factors such as maternal health issues, insufficient lactation, or reliance on alternative feeding methods like formula or animal milk.Additionally, two children in the study were reportedly never breastfed. The absence of breastfeeding could be attributed to medical complications, maternal constraints, or personal choices.

This study also analyzed the supplementary feeding practices among 253 children from West Khasi Hills, with 115 children from Nongstoin and 138 from Ri-Muliang. A significant proportion of children (58.05%) did not receive any form of supplementary food. This included 37.55% of children from Ri-Muliang and 29.95% from Nongstoin. The high percentage of children without supplementary feeding suggests a reliance on primary dietary sources, including breastfeeding and family meals, without additional nutritional interventions. This trend may be influenced by economic constraints, limited awareness about supplementation, or cultural feeding practices. Again, 23.30% of children were given homemade food supplements, with Nongstoin having a comparatively higher proportion (13.04%) than Ri-Muliang (10.28%). Homemade supplements typically include locally available nutrient-rich foods such as rice porridge, lentil soup, mashed vegetables, and fruit preparations. The preference for homemade supplements indicates that some caregivers recognize the importance of dietary diversification. About 15.03% of children were consuming commercialized supplementary food, with Nongstoin again showing a higher frequency (9.09%) compared to Ri-Muliang (5.93%). Commercial supplements often include formula milk, packaged baby cereals, and fortified foods. The relatively lower adoption of commercialized supplementation in Ri-Muliang could be due to affordability issues, limited market availability, or a stronger inclination toward traditional feeding practices. However, in Nongstoin, a higher percentage of children consuming commercial supplements may reflect greater access to markets, higher parental awareness, or a preference for perceived convenience and nutrition benefits.

The present study examined the administration of medicinal supplements among 253 children from West Khasi Hills, including 115 children from Nongstoin and 138 from Ri-Muliang. Out of

the total sample, 177 children (69.96%) reportedly received medicinal supplements, indicating a widespread practice of nutritional supplementation. Among them, 36.36% were from Ri-Muliang, while 33.69% were from Nongstoin. The relatively high proportion of supplemented children suggests an active intervention to address potential micronutrient deficiencies, particularly in growing children. However, 30.04% of children did not receive any medicinal supplementation, which raises concerns about potential gaps in healthcare access or awareness regarding the benefits of such supplements.In most cases, the medicinal supplements provided included essential vitamins and minerals crucial for child growth and development. The commonly administered supplements wereVitamin A, D, and E, Calcium , Vitamin B12 , Iron and Folic Acid etc. These supplements play a vital role in preventing nutritional deficiencies and ensuring the healthy growth of children, particularly in resource-limited settings where dietary diversity may be inadequate.The study found that most of these supplements were provided bygovernment health centres, emphasizing the role of public health initiatives in addressing child malnutrition. The distribution of these supplements through Anganwadi centres, public hospitals, and outreach programs indicates an organized approach to child healthcare.

Chapter 4

Morbidity, Mortality, Clinical Signs and Symptoms ofNongstoin and Ri – Muliang Blocks of West Khasi Hills:

The present study generally focuses on understanding the morbidity and mortality of the Khasi community of Nongstoin and Ri – Muliang block of West Khasi Hills Districts of Meghalaya.

Morbidity usually refers to having a specific illness, diseases, health or medical conditions. Among the studied community prevalence of non – communicable diseases such as cold, cough, fever, hypertension, respiratory problems are found. In Nongstoin block, as stated by the BPM (Block Project Manager) of Nongstoin block, respiratory infections are quite common because of pollution from the vehicles. Adults also suffer from lung infection because of smoking of tobacco leaves, locally known as *Duma.* Whereas, in Ri – Muliang block, as stated by AYUSH doctor of Nonglang PHC (Primary Health Centre) and ANM of Kyrdum Sub – centre, there is a prevalence of diarrhea and typhoid among children, also there is a prevalence of scrub typhus among both adults and children but adults suffer more from the disease. In Nongstoin block there are 10 registered cases of tuberculosis and in Ri – Muliang block, there is one registered case of tuberculosis who are getting treated under National Tuberculosis Elimination Programme (NTEP), availing free medicines and checkups and also financial assistance of rupees 500 per month during entire period of their treatment. Also, in the two villages of Nongstoin block, Mawit and Rambrai (unstudied villages) there is a prevalence of malaria and dengue. Whereas, in Ri – Muliang block there is less prevalence of malaria and dengue because of constant spraying of DDT and also distribution of medicated long lasting mosquito nets to the villagers.

Therefore, on the basis of the data collected from both Nongstoin and Ri – Muliang block tables of major and minor morbidity is prepared.

Part A

Mortality Status of Adults and Children in Nongstoin and Ri – Muliang Block

Table 60: Cases of Major Morbidity (self-reported) among the Studied Population (18-60 years)in West Khasi Hills District (Nongstoin and Ri – Muliang block) (reference period of 12 months)

Diseases	No. of Cases (Nongstoin block)	No. of Cases (Ri – Muliang block)	Total Cases in West Khasi Hills (Nongstoin and Ri –

			Muliang)
Diabetes	6 (12%)	8 (12.70%)	14(12.28%)
Gout	1 (2%)	0 (0.00%)	1 (0.88%)
High blood pressure	14 (28%)	17 (26.98%)	31 (27.19%)
Heart problem	2 (4%)	0	2 (1.75%)
Low blood pressure	5 (10%)	7 (11.11%)	12 (10.53%)
Arthritis	1 (2%)	0	1(0.88%)
Nerve problem	1 (2%)	4 (6.35%)	5(4.39%)
Thyroid	4 (8%)	1 (1.56%)	5(4.39%)
Paralysis	1 (2%)	0	1(0.88%)
Nephrectomy	1(2%)	0	1(0.88%)
Geriatrics	1 (2%)	0 (0.00%)	1(0.88%)
Slip disc	1(2%)	0	1(0.88%)
Mental disability	2 (4%)	0	2(0.88%)
Gastritis	4 (8%)	8 (12.50%)	12(10.53%)
Piles	1 (2%)	0	1 (0.88%)
Urinary tract infection	1 (2%)	0	1(0.88%)
Ovarian Cysts	1 (2%)	1 (1.56%)	2(1.75%)
Sinusitis	1 (2%)	0	1(0.88%)
Fatty liver	1(2%)	4 (6.25%)	5(4.39%)
Gall bladder stone	1 (2%)	3 (4.69%)	4(3.51%)
Kidney stones	0	5 (7.81%)	5(4.39%)
Prolonged body and joint pain	0	2 (3.13%)	2 (1.75%)
Insomia	0	1 (1.56%)	1(0.88%)
Ulcer	0	1(1.56%)	1(0.88%)
Hearing impairment	0	1 (1.56%)	1(0.88%)
Total	50 (43.86%)	64(56.14%)	114 (100%)

NB: illness suffered from more than 10 days and/ any hospitalization by the members of the household

The table presents the distribution of major morbidity cases among adults aged 18 to 60 years from the studied population in both Nongstoin and Ri–Muliang blocks of the West Khasi Hills district. A total of 114 morbidity cases were recorded, with 50 cases reported from the Nongstoin block and 64 from the Ri–Muliang block.Among the various health conditions observed, high blood pressure emerged as the most frequently reported morbidity, accounting for 27.19% of all cases. This was followed by diabetes (12.28%) and low blood pressure (10.53%), indicating a significant burden of non-communicable diseases within the adult population of both blocks.Additionally, several other health issues were commonly reported across both blocks, including gastritis (10.53%), thyroid disorders (4.39%), nerve-related problems (4.39%), fatty liver (4.39%), gall bladder stones (3.51%), and ovarian cysts (1.75%). These findings suggest a wide spectrum of chronic and lifestyle-related health conditions affecting the population.

Interestingly, some morbid conditions were found to be block-specific. In the Nongstoin block, cases of paralysis (0.88%), slip disc (0.88%), and nephrectomy (0.88%) were exclusively reported. On the other hand, the Ri–Muliang block showed a distinct pattern with cases such as kidney stones (7.81%), hearing impairment (1.56%), and insomnia (1.56%) being reported only in that region.This variation in morbidity patterns between the two blocks may reflect differences in environmental exposures, healthcare access, occupational patterns, or socio-cultural factors, which merit further exploration.

Table 61: Cases of Minor Morbidity (self-reported) among the Studied Population (18-60years) in West Khasi Hills District (Nongstoin and Ri – Muliang block) (reference period of 3 months)

Diseases	No. of Cases (Nongstoin block)	No. of Cases (Ri – Muliang block)	Total Cases in West Khasi Hills (Nongstoin and Ri – Muliang)
Flu	2 (4.76%)	0	2 (1.71%)
Lower back pain	1(2.38%)	0	1 (0.85%)
Cold	10(23.81%)	16(21.33%)	26(22.22%)
Cough	11 (26.19%)	15(20.00%)	26(22.22%)
Migraine	1 (2.38%)	0	1(0.85%)
Fever	8(19.05%)	23(30.67%)	31 (26.50%)
Headache	3(7.14%)	4 (5.33%)	7 (5.98%)
Ear pain	1 (2.38%)	1 (1.33%)	2(1.71%)
Weakness	1 (2.38%)	1 (1.33%)	2(1.71%)

Diseases			
Stomach pain	1 (2.38%)	0	1(0.85%)
Cramps	2 (4.76%)	4 (5.33%)	6 (5.13%)
Tonsil	1(2.38%)	1(1.33%)	2(1.71%)
Typhoid	0	8 (10.67%)	8 (6.84%)
Sore throat	0	1 (1.33%)	1(0.85%)
Chest pain	0	1 (1.33%)	1(0.85%)
Total	42 (35.90%)	75(64.10%)	117 (100%)

NB: illness suffered from less than 10 days by the members of the household

The table illustrates the distribution of minor morbidity cases among adults aged 18 to 60 years in the studied population of Nongstoin and Ri–Muliang blocks within the West Khasi Hills district. A total of 117 minor morbidity cases were recorded, with 42 cases (35.90%) reported from Nongstoin block and a comparatively higher number of 75 cases (64.10%) reported from Ri–Muliang block.

Among the various minor ailments, fever was the most frequently reported condition, accounting for 26.50% of all cases. Notably, the prevalence of fever was higher in Ri–Muliang block (30.67%) compared to Nongstoin block (19.05%), indicating a possible variation in environmental or health-related factors between the two regions.Cold and cough were also commonly reported in both blocks. In Nongstoin, 23.81% of the minor morbidity cases were due to cold, and 26.19% were due to cough. In Ri–Muliang, cold accounted for 21.33% of the cases, while cough represented 20.00%. These respiratory issues appear to be widespread across both blocks, possibly linked to climatic conditions or seasonal infections.Additionally, other minor health problems such as headache (5.98%), cramps (5.13%), and typhoid (6.84%) were reported from both blocks. However, typhoid was notably more prevalent in Ri–Muliang block, where it constituted 10.67% of the reported cases, while no such cases were observed in Nongstoinblock.The observed differences in the pattern and frequency of minor morbidity between the two blocks highlight the need for block-specific public health interventions. Factors such as sanitation, water quality, climate variability, and access to primary healthcare services may play a role in shaping these health trends and should be examined further through focused field investigations.

Table 62: Cases of Major Morbidity (reported by mothers) among the Studied Population (0 – 17 years) in West Khasi Hills District (Nongstoin and Ri – Muliang block)

Diseases	No. of Cases (Nongstoin block)	No. of Cases (Ri – Muliang block)	Total Cases in West Khasi Hills

			(Nongstoin and Ri – Muliang)
Mental disability	1 (16.67%)	1 (25%)	2(20%)
Pneumonia	1 (16.67%)	1 (25%)	2(20%)
Nerve problem	1 (16.67%)	0	1(10%)
Chest congestion	2 (33.33%)	0	2(20%)
Hole in heart	1 (16.67%)	0	1(10%)
Swollen cheeks	0	1 (25%)	1(10%)
Club foot	0	1 (25%)	1(10%)
Total	6(60%)	4(40%)	10(100%)

The table presents data on major morbidity cases among children in the studied population of both Nongstoin and Ri–Muliang blocks in the West Khasi Hills district. A total of 10 major morbidity cases were recorded, with 6 cases (60%) reported from Nongstoin block and the remaining 4 cases (40%) from Ri–Muliang block.Among the reported conditions, mental disability and pneumonia were observed in both blocks, each accounting for 20% of the total cases. These conditions reflect the presence of both developmental and infectious diseases affecting children in the region.Certain morbidity conditions, however, were specific to individual blocks. In the Nongstoin block, chest congestion was the most frequently reported condition, representing 33.33% of the block's total cases, followed by a case of congenital heart defect (hole in the heart), which accounted for 16.67%. These findings point to respiratory and cardiac-related health concerns among children in this area.Conversely, in the Ri–Muliang block, unique cases such as club foot and swollen cheeks were reported, each comprising 25% of the total morbidity cases in the block. These conditions may indicate congenital or nutritional issues specific to the region.

The limited yet varied distribution of major morbidity cases among children in both blocks highlights the need for targeted pediatric healthcare interventions and further investigation into environmental, genetic, and nutritional factors influencing child health in the area.

Table 63: Cases of Minor Morbidity (reported by mothers) among the Studied Population (Children from 0 – 17 years) in West Khasi Hills District (Nongstoin and Ri – Muliang block)

Diseases	No. of Cases (Nongstoin block)	No. of Cases (Ri – Muliang block)	Total Cases in West Khasi Hills (Nongstoin and Ri –

			Muliang)
Fever	7 (35%)	62(37.80%)	69 (37.50%)
Cough	6 (30%)	50(30.49%)	56 (30.43%)
Cold	5 (25%)	46 (28.05%)	51 (27.72%)
Headache	1 (5%)	0	1 (0.54%)
Diarrhoea	0	2(1.22%)	2 (1.09%)
Stomach pain	1 (5%)	1(0.61%)	2(1.09%)
Typhoid	0	2 (1.22%)	2(1.09%)
Fracture	0	1 (0.61%)	1(0.54%)
Total	20 (10.87%)	164 (89.13%)	184 (100%)

The table presents the findings on minor morbidity cases among children (0–17 years) from the studied population of both Nongstoin and Ri–Muliang blocks in the West Khasi Hills district. A total of 184 minor morbidity cases were recorded, with 20 cases (10.87%) reported from the Nongstoin block and a significantly higher number of 164 cases (89.13%) from the Ri–Muliangblock.Fever emerged as the most common minor morbidity among children across both blocks, accounting for 37.50% of the total cases. Specifically, fever was reported in 35% of cases in Nongstoin and 37.80% in Ri–Muliang, indicating its widespread prevalence.Cough (30.43%) and cold (27.72%) were also frequently reported among children in both blocks, suggesting a high occurrence of respiratory-related ailments, possibly linked to environmental or seasonal factors.In terms of block-specific conditions, diarrhoea (1.22%) and typhoid (1.22%) were exclusively reported from the Ri–Muliang block, pointing to possible issues related to water quality or sanitation. On the other hand, headache (5%) and stomach pain (5%) were reported only in Nongstoin block, suggesting different patterns of minor health issues possibly influenced by localized dietary or lifestyle factors.

The findings highlight the need for targeted public health measures, especially in the Ri–Muliang block where the burden of minor morbidity among children is considerably higher.

Part B

Mortality Status of Adults and Children in Nongstoin and Ri – Muliang Block of West Khasi Hills

Table 64 :Neonatal, Infant and Child Mortality inNongstoin Block of West Khasi Hills (2021-2023)

Year	Neonatal Death (N = 11)	Infant Death (N = 12)	Child Death (N = 4)	Total (N = 27)

	Male	Female	Male	Female	Male	Female	Male	Female
2021 - 2023	6 (22.22%)	5 (18.52%)	5 (18.52%)	7 (25.93%)	2 (7.41%)	2 (7.41%)	13 (48.15%)	14 (51.85%)

N.B. 3 Still Births were reported from Nongstoin block.

The above table depicts the cases of neonatal, infant and child mortality of less than 5 year old children in Nongstoin block for three consecutive years. It can be understood from the table that a total of 27 children of less than 5 years died in different phases of development which depicted more female deaths (51.85%) than male deaths (48.15%) in Nongstoin block. In case of neonatal mortality, 18.52% females died within 28 days of their birth which is quite higher than the male deaths (22.22%). Whereas, in case of infant mortality, 25.93% of females died within 12 months of their birth which is again higher than the infant deaths among the males (18.52%). Moreover, equal percentages of males and females i.e., 7.41% expired within 12 months to 59 months of their birth.

Table 65:Neonatal, Infant and Child Mortality inRi - Muliang Block of West Khasi Hills (2021-2023)

Year	Neonatal Death (N = 17)		Infant Death (N = 20)		Child Death (N = 3)		Total (N = 40)	
	Male	**Female**	**Male**	**Female**	**Male**	**Female**	**Male**	**Female**
2021 - 2023	13 (32.50%)	4 (10.00%)	11 (27.50%)	9 (22.50%)	2 (5.00%)	1 (2.50%)	26 (65.00%)	14 (35.00%)

N.B. 5 Still Births were reported from Ri – Muliangblock.

The above table depicts the cases of neonatal, infant and child mortality of less than 5 year old children in Ri – Muliang block for three consecutive years. It can be understood from the table that a total of 40 children of less than 5 years died in different phases of development which depicted more male deaths (65%) than female deaths (35%) in Ri – Muliang block. In case of neonatal mortality, 32.50 males died within 28 days of their birth which is quite higher than the female deaths (10%). Whereas, in case of infant mortality, 27.50% of males died within 12 months of their birth which is again higher than the infant deaths among the females (22.50%). Also, when child mortality is concerned, 5% male deaths were reported who expired within 12 months to 59 months of their birth.

Table 66: Disease/Cause Specific Neonatal, Infant and Child Mortality in Nongstoin Block of West Khasi Hills (N: 27) (2021-2023)

Disease/Cause	Neonatal Death		Infant Death		Child Death		All categories		
	Male	**Female**	**Male**	**Female**	**Male**	**Female**	**Male**	**Female**	**Total**
High fever	0	1 (3.70%)	1 (3.70%)	0	1 (3.70%)	0	2 (7.41%)	1 (3.70%)	3 (11.11%)
Spinal Bafida	0	0	0	1 (3.70%)	0	1 (3.70%)	0	2 (7.41%)	2 (7.41%)

Dysentry	0	0	1 (3.70%)	0	0	0	1 (3.70%)	0	1 (3.70%)
Heart Problem	0	1 (3.70%)	0	2 (7.41%)	0	0	0	3 (11.11%)	3 (11.11%)
Jaundice	0	1 (3.70%)	0	0	0	0	0	1 (3.70%)	1 (3.70%)
Stomach Pain	0	1 (3.70%)	1 (3.70%)	1 (3.70%)	0	1 (3.70%)	1 (3.70%)	3 (11.11%)	4 (14.81%)
Diarrhoea and Vomiting	0	0	0	0	1 (3.70%)	0	1 (3.70%)	0	1 (3.70%)
After Vaccination	1 (3.70%)	0	0	0	0	0	1 (3.70%)	0	1 (3.70%)
Pneumonia	0	0	0	1 (3.70%)	0	0	0	1 (3.70%)	1 (3.70%)
Fever, Chest Congestion and Cough	0	0	2 (7.41%)	1 (3.70%)	0	0	2 (7.41%)	1 (3.70%)	3 (11.11%)
Premature Birth	1 (3.70%)	0	0	0	0	0	1 (3.70%)	0	1 (3.70%)
Kidney Failure	0	0	0	1 (3.70%)	0	0	0	1 (3.70%)	1 (3.70%)
Undiagnosed	4 (14.81%)	1 (3.70%)	0	0	0	0	4 (14.81%)	1 (3.70%)	5 (18.52%)
Total	6 (22.22%)	5 (18.52%)	5 (18.52%)	7 (25.93%)	2 (7.41%)	2 (7.41%)	13 (48.15%)	14 (51.85%)	27 (100.00%)

The table depicts disease or cause specific deaths among children of less than 5 years in Nongstoin block. From the table it can be understood that higher percentages of children died because of stomach pain (14.81%). Whereas, equal percentages of children expired because of high fever (11.11%), heart problem (11.11%) and fever, chest congestion and cough (11.11%). Similarly, equal percentages of children expired because of dysentery (3.70%), jaundice (3.70%), diarrhoea and vomiting (3.70%), after giving vaccination (3.70%), pneumonia (3.70%), premature birth (3.70%) and kidney failure (3.70%). Other than disease or cause specific deaths, there were 18.52% deaths whose causes were either not recorded or unknown to the mothers and hence classified as undiagnosed.

Table 67 :Disease/Cause Specific Neonatal, Infant and Child Mortality in Ri – Muliang Block of West Khasi Hills (N: 40) (2021-2023)

Disease/Cause	Neonatal Death		Infant Death		Child Death		All categories		
	Male	**Female**	**Male**	**Female**	**Male**	**Female**	**Male**	**Female**	**Total**
Swollen Feet	0	0	0	1 (2.50%)	0	0	0	1 (2.50%)	1 (2.50%)

Diarrhoea and Vomiting	0	0	2 (5.00%)	3 (7.50%)	0	0	2 (5.00%)	3 (7.50%)	5 (12.50%)
No Urinary System	0	1 (2.50%)	0	0	0	0	0	1 (2.50%)	1 (2.50%)
Breathing Problem	0	1 (2.50%)	0	1 (2.50%)	1 (2.50%)	0	1 (2.50%)	2 (5.00%)	3 (7.50%)
Fever	3 (7.50%)	0	4 (10.00%)	3 (7.50%)	0	0	7 (17.50%)	3 (7.50%)	10 (25.00%)
Heart Failure	1 (2.50%)	0	1 (2.50%)	0	0	0	2 (5.00%)	0	2 (5.00%)
Throat Problem	0	0	0	1 (2.50%)	0	0	0	1 (2.50%)	1 (2.50%)
Chest Congestion	0	0	3 (7.50%)	0	0	0	3 (7.50%)	0	3 (7.50%)
Jaundice	2 (5.00%)	0	0	0	0	0	2 (5.00%)	0	2 (5.00%)
After giving Vaccination	0	0	1 (2.50%)	0	0	0	1 (2.50%)	0	1 (2.50%)
Dengue	0	0	0	0	0	1 (2.50%)	0	1 (2.50%)	1 (2.50%)
Premature Birth	2 (5.00%)	1 (2.50%)	0	0	0	0	2 (5.00%)	1 (2.50%)	3 (7.50%)
Undiagnosed	5 (12.50%)	1 (2.50%)	0	0	1 (2.50%)	0	6 (15.00%)	1 (2.50%)	7 (17.50%)
Total	13 (32.50%)	4 (10.00%)	11 (27.50%)	9 (22.50%)	2 (5.00%)	1 (2.50%)	26 (65%)	14 (35.00%)	40 (100.00%)

The table depicts disease or cause specific deaths among the children of less than 5 years in Ri – Muliang block. From the table it can be understood that, higher percentages of children died because of fever (25%), children also died because of diarrhoea and vomiting (12.50%) which happens because of drinking water from streams or ponds or sometimes drinking water which is not appropriately filtered. Also, equal percentages of children succumbed to death because of breathing problem (7.50%), chest congestion (7.50%) and premature birth (7.50%). Similarly, equal percentages of children expired because of heart failure (5%) and jaundice (5%), swollen feet (2.50%), no urinary system (2.50%), throat problem (2.50%), after giving vaccination (2.50%) and dengue (2.50%). Moreover, other than disease or cause specific deaths, there were 17.50% deaths whose causes were either not recorded or unknown to the mothers and hence classified as undiagnosed.

Table 68: Mortality Status of Adult Household Members in Nongstoin Block (N:18)(2021-2024)

Year	Male (18 – 60 years)	Female (18 – 60 years)	Male (60+ years)	Female (60+ years)	Overall Reported Deaths		
					Male (%)	Female (%)	Total (%)
2021	5 (27.78%)	0	2 (11.11%)	2 (11.11)	7 (38.89%)	2 (11.11%)	9 (50.00%)
2022	2 (11.11)	0	1 (5.56%)	1 (5.56%)	3 (16.67%)	1 (5.56%)	4 (22.22%)
2023	0	0	3 (16.67%)	1 (5.56%)	3 (16.67%)	1 (5.56%)	4 (22.22%)
2024	0	0	0	1 (5.56%)	0	1 (5.56%)	1 (5.56%)
Total	7 (38.89%)	0	6 (33.33%)	5 (27.78%)	13 (72.22%)	5 (27.78%)	18 (100.00%)

The above table presents the mortality status of adult household members in the Nongstoin block of West Khasi Hills District, Meghalaya, during the period 2021 to 2024. Over this four-year period, a total of 18 adult deaths were reported, comprising 13 males and 5 females. In 2021, the highest number of deaths was recorded, with 9 cases in total. These included 7 males—5 from the 18–60 years age group and 2 from the above 60 years age group—and 2 females, both of whom were above 60 years of age. In 2022, a total of 4 deaths were reported, including 3 males (2 from the 18–60 years age group and 1 from the above 60 years group) and 1 female (above 60 years). Similarly, in 2023, the same number of deaths (4) was recorded. All 4 cases were from the older age group, comprising 3 males and 1 female, all aged above 60 years. In 2024, only one mortality case was reported, involving a female from the above 60 years age group.

Overall, out of the 18 mortality cases reported during 2021–2024, 13 were males and 5 were females. Among the male deaths, 7 occurred in the 18–60 years age group, while the remaining 6 were aged above 60 years. Notably, all female deaths (n=5) were from the above 60 years age group, indicating a higher mortality burden among elderly women in this population. These findings point to a significant concentration of adult mortality among older individuals, particularly males in the working-age group and elderly females, and may reflect underlying health, lifestyle, or healthcare access disparities that warrant further investigation.

Table 69 :Mortality Status of Adult Household Members in Ri – Muliang Block (N:14) (2021-2024)

Year	Male (18 – 60 years)	Female (18 – 60 years)	Male (60+ years)	Female (60+ years)	Overall Reported Deaths		
					Male (%)	Female (%)	Total (%)

2021	1 (7.14%)	1 (7.14%)	0	0	1 (7.14%)	1 (7.14%)	2 (14.29%)
2022	0	0	1(7.14%)	2(14.29%)	1(7.14%)	2(14.29%)	3(21.43%)
2023	2(14.29%)	1(7.14%)	0	0	2(14.29%)	1 (7.14%)	3(21.43%)
2024	3(21.43%)	1(7.14%)	2(14.29%)	0	5(35.71%)	1 (7.14%)	6(42.86%)
Total	6(42.86%)	3 (21.43%)	3 (21.43%)	2 (14.29%)	9 (64.29%)	5 (35.71%)	14 (100.00%)

The table presents the mortality status of adult household members in the Nongstoin block of West Khasi Hills District, Meghalaya, over the four-year period from 2021 to 2024. A total of 14 adult mortality cases were recorded during this period, comprising 9 males and 5 females. The analysis of the yearly distribution reveals some notable trends. In 2021, there was an equal number of male and female deaths—one male and one female—both belonging to the 18–60 years age group.In 2022, an exception to the general trend was observed, as female deaths (2 cases) outnumbered male deaths (1 case). All three individuals who died that year were aged above 60 years, indicating a shift toward elderly mortality during that period.In 2023, the pattern resembled that of 2021. A total of three deaths were reported, including two males and one female, all of whom belonged to the 18–60 years age group. This suggests a recurring vulnerability among the working-age adult population, especially males.The highest number of deaths occurred in 2024, with a total of six cases—five males and one female. Among the male deaths, three were from the 18–60 years age group and two were aged above 60 years. The sole female death reported that year was also from the 18–60 years age group.

Overall, the findings of this table reflect a higher mortality burden among male adults, particularly within the economically productive age group of 18–60 years. While female mortality was lower in general, it was notable in 2022, especially among the elderly. These trends underscore the need for age- and gender-specific health interventions, especially targeting adult males in the working-age population and elderly females who may be more vulnerable due to chronic health conditions or limited access to care.

Table 70: Disease/Cause Specific Adult Mortality Status in Nongstoin Block (N:18)

Disease/Cause	2021		2022		2023		2024		Total
	Male (%)	Female (%)	Male (%)	Female (%)	Male (%)	Female (%)	Male (%)	Female (%)	
Geriatrics	0	0	0	1 (5.56%)	0	0	0	0	1 (5.56%)
Diabetes and High Blood Pressure	0	0	0	0	0	0	0	1 (5.56%)	1 (5.56%)
Pressure	0	1	0	0	0	0	0	0	1

Stroke		(5.56%)							(5.56%)
Cardiac Arrest	1 (5.56%)	0	1 (5.56%)	0	2 (11.11%)	0	0	0	4 (22.22%)
Cancer	3 (16.67%)	0	0	0	1 (5.56%)	1 (5.56%)	0	0	5 (27.78%)
Stomach Ulcer	0	0	1 (5.56%)	0	0	0	0	0	1 (5.56%)
Lung Failure	0	0	1 (5.56%)	0	0	0	0	0	1 (5.56%)
Liver Failure	1 (5.56%)	0	0	0	0	0	0	0	1 (5.56%)
Burn	1 (5.56%)	0	0	0	0	0	0	0	1 (5.56%)
Undiagnosed	1 (5.56%)	1 (5.56%)	0	0	0	0	0	0	2 (11.11%)
Total	7 (38.89%)	2 (11.11%)	3 (16.67%)	1 (5.56%)	3 (16.67%)	1 (5.56%)	0	1 (5.56%)	18 (100%)

The table above illustrates the disease- or cause-specific adult mortality status in Nongstoin Block. A total of 18 mortality cases were reported between 2021 and 2024. Among these, the highest number of deaths were attributed to cancer (27.78%), followed by cardiac arrest (22.22%). Two cases (11.11%) were recorded with undiagnosed causes. The remaining mortality cases were distributed across various other causes, with only a single death reported under each category in the study. This uneven distribution of mortality causes highlights the critical need for targeted health interventions focused on non-communicable diseases, particularly cancer and cardiovascular conditions.

Among the five cancer-related deaths, four were males and one was female. This gender disparity may reflect differences in health-seeking behavior, occupational exposure, or lifestyle-related risk factors such as tobacco use, which tend to be higher among males in many rural and semi-urban contexts. Interestingly, the year 2021 alone accounted for three out of the five cancer deaths, suggesting either a cluster of late-stage diagnoses or a possible lack of access to timely screening and treatment services during or after the COVID-19 pandemic. In subsequent years, the number of cancer-related deaths appeared to decline, with only two cases reported in 2023—one male and one female. This decline, however, may not necessarily indicate a reduction in cancer incidence but could reflect underreporting, migration, or improvements in access to care and early diagnosis.Cardiac arrest emerged as the second leading cause of adult mortality, with four deaths, all occurring in males. This all-male pattern may again point to gendered risk factors, including stress, high blood pressure, smoking, alcohol consumption, and limited regular medical check-ups. One death each was recorded in 2021 and 2022, followed by two in 2023, indicating a potential upward trend or increasing vulnerability among adult males to

cardiovascular conditions. The consistent occurrence across years also emphasizes the importance of preventive healthcare and lifestyle modification campaigns in the studied area. The presence of undiagnosed causes of death (11.11%) signals gaps in diagnostic capacity and the need for strengthened medical certification and reporting systems. Accurate identification of causes of death is essential for formulating effective health policies and allocating resources appropriately.

The present finding underscores the burden of non-communicable diseases such as cancer and cardiac conditions in the adult population of Nongstoin Block. Gender differences in mortality patterns further call for gender-sensitive health interventions and awareness programs. Simultaneously, the need for robust surveillance and diagnostic infrastructure remains a pressing concern to ensure comprehensive mortality tracking and improved community health outcomes.

Table 71: Disease/Cause Specific Adult Mortality Status in Ri – Muliang Block (N:14)

Disease/Cause	2021		2022		2023		2024		Total
	Male (%)	Female (%)	Male (%)	Female (%)	Male (%)	Female (%)	Male (%)	Female (%)	
Epilepsy	1 (7.14%)	0	0	0	0	0	0	0	1 (7.14%)
Bleeding and Fits	0	0	0	0	0	1 (7.14%)	0	0	1 (7.14%)
Ulcer	0	0	0	0	0	0	1 (7.14%)	0	1 (7.14%)
Nerve Issues	0	0	0	0	0	0	1 (7.14%)	0	1 (7.14%)
Asthma	0	0	1 (1.74%)	0	0	0	0	0	1 (7.14%)
Cancer	0	1 (7.14%)	0	0	0	0	1 (7.14%)	1 (7.14%)	3 (21.43%)
Pneumonia and Fever	0	0	0	0	0	0	1 (7.14%)	0	1 (7.14%)
Kidney Failure	0	0	0	0	1 (7.14%)	0	0	1 (7.14%)	2 (14.29%)
Diabetes	0	0	0	1 (7.14%)	0	0	0	0	1 (7.14%)
Cardiac arrest	0	0	0	1 (7.14%)	0	0	0	0	1 (7.14%)
Undiagnosed	0	0	0	0	1 (7.14%)	0	0	0	1 (7.14%)
Total	1 (7.14%)	1 (7.14%)	1 (7.14%)	2 (14.29%)	2 (14.29%)	1 (7.14%)	4 (28.57%)	2 (14.29%)	14 (100%)

The table above presents the disease- or cause-specific adult mortality status of Ri-Muliang Block in the West Khasi Hills District of Meghalaya for the period 2021–2024. A total of 14 adult mortality cases were recorded during this timeframe. Among these, cancer emerged as the leading cause of death, accounting for 21.43% of the total cases (3 out of 14), followed by kidney failure, which contributed to 14.29% of deaths (2 cases). One case (7.14%) remained undiagnosed, indicating possible limitations in diagnostic capabilities or medical certification of cause of death. The remaining mortality cases were attributed to a variety of causes, each contributing one case (7.14% each), and included conditions such as epilepsy, ulcer, nerve-related issues, asthma, pneumonia, and others—highlighting the diverse nature of health challenges in the region.

A closer examination of cancer-related deaths reveals that one female death occurred in 2021, while two additional cases were reported in 2024—one male and one female. This distribution suggests a possible resurgence or detection of cancer cases in 2024 after a gap in the intervening years, which may point toward late-stage diagnosis or an increase in awareness and reporting. The data also reveals that cancer affects both sexes, though slightly more females were impacted in this sample.Kidney failure was identified as the second most common cause of death, with two reported cases—one male death in 2023 and one female death in 2024. The occurrence of these deaths in consecutive years may indicate rising concerns over chronic kidney conditions in the population, potentially linked to hypertension, diabetes, or lack of access to early diagnostic and treatment services in rural health setups.The presence of a single undiagnosed death case is a critical reminder of the need to strengthen healthcare infrastructure, particularly in rural and remote blocks like Ri-Muliang, where timely access to qualified medical professionals and diagnostic facilities may be limited. Improving mortality surveillance and cause-of-death reporting is essential for accurate public health planning.

Overall, the present data underscores the growing burden of non-communicable diseases such as cancer and kidney failure in the region, while also revealing scattered occurrences of other serious health conditions. These findings highlight the importance of preventive healthcare, early diagnosis, and awareness campaigns at the community level to reduce adult mortality and improve overall health outcomes in Ri-Muliang Block.

Comparative Summary of Adult Mortality between Nongstoin and Ri-Muliang Block (2021–2024)

Cancer is the leading cause of adult mortality in both blocks, suggesting a significant burden of non-communicable diseases across the studied area. However, the temporal pattern differs: in Nongstoin, cancer deaths were more concentrated in earlier years, while Ri-Muliang reported resurgence in 2024. On the other hand, cardiac arrest is a major concern in Nongstoin,

particularly among males, but was not reported in Ri-Muliang during the study period. This could reflect real epidemiological differences or underdiagnosis. Kidney failure, while absent in Nongstoin data, emerged as a notable cause in Ri-Muliang, pointing toward possible local health risks such as untreated hypertension, diabetes, or poor access to nephrology care.

Gender disparities are evident, especially in Nongstoin where males dominate both cancer and cardiac mortality. In Ri-Muliang, cancer deaths show a more balanced gender distribution, and kidney failure affected both sexes equally. Undiagnosed cases were reported in both blocks, indicating gaps in healthcare delivery and diagnostic infrastructure.

The comparative analysis highlights the shared burden of non-communicable diseases in both Nongstoin and Ri-Muliang blocks, with unique block-level patterns in mortality causes and gender distribution. These insights underscore the need for tailored public health interventions, improved screening and diagnostic services, and enhanced awareness programs to address preventable adult deaths in both areas.

Part C: Clinical Signs and Symptoms in the Studied Population in Nongstoin and Ri – Muliang Block of West Khasi Hills

Table 72: Clinical signs and Symptoms of Nongstoin and Ri – Muliang block of West Khasi Hills District

Categories	Clinical signs and Symptoms	Nongstoin	Ri - Muliang	West Khasi Hills (Nongstoin +Ri – Muliang)
General Appearance	Normal	355 (47.20%)	394 (52.39%)	752 (100%)
	Loss of Subcutaneous fats	2 (0.26%)	1 (0.13%)	
	Sunken or Hollow Cheeks	0 (0.00%)	0 (0.00%)	
Nails	Normal	356 (47.34%)	395 (52.52%)	752 (100%)
	Spoon shaped	1 (0.13%)	0 (0.00%)	
Skin	Normal	298 (39.62%)	351 (46.67%)	752 (100%)
	Dry and Scaly	5 (0.66%)	0	
	Nasolabial seborrhea	0	0	
	Psoriasis from rash	0	0	

	Pallor	0	0	
	Follicular hyperkeratosis	0	0	
	Hyperpigmentation	53 (7.04%)	44 (5.85%)	
	Easy bruising	0	0	
	Dry and scaly +Hyperpigmentation	1 (0.13%)	0	
Eyes	Normal	356 (47.34%)	395 (52.52%)	752 (100%)
	Night blindness	0	0	
	Photophobia	1 (0.13%)	0	
	Bitot spots/Xerosis	0	0	
Mouth	Normal	355 (47.20%)	395 (52.52%)	752 (100%)
	Glossitis	0	0	
	Cheilosis	1 (0.13%)	0	
	Decreased taste or smell	1 (0.13)	0	
	Loss of tooth enamel	0	0	
Neck	Normal	357 (47.47%)	395 (52.52%)	752 (100%)
	Goitre	0	0	
	Parotid enlargement	0	0	
Extremities	Normal	279 (37.10%)	351 (46.67%)	752 (100%)
	Ascities	0	0	
	Oedema in legs	0	0	
	Bone/Joint pain	43 (5.71%)	12 (1.59%)	
	Muscle pain	16 (2.12%)	15 (1.99%)	

Muscle wasting	0	0	
Bone joint pain+Muscle pain	19 (2.52%)	17 (2.26%)	

The table presents the clinical signs and symptoms observed among the studied population from Nongstoin and Ri-Muliang Blocks of West Khasi Hills District, Meghalaya, aimed at assessing the current nutritional health status of household members. A total of 752 individuals were examined based on their availability from both blocks—NongstoinandRi-Muliang.The findings revealed that 47.20% of individuals from Nongstoin and 52.39%from Ri-Muliang appeared normal in general appearance, indicating that just under half in Nongstoin and just over half in Ri-Muliang showed no overt clinical signs of nutritional deficiency. This suggests a slightly better general nutritional profile among individuals from Ri-MuliangBlock.However, clinical signs of nutritional deficiencieswere observed in a small but significant proportion of the population. In terms of subcutaneous fat loss, 0.26% of individuals in Nongstoin and 0.13% in Ri-Muliang exhibited visible signs. Such fat loss may be indicative of chronic energy deficiency.In the category of nail abnormalities, only0.13% of individuals from Nongstoin showed signs of **spoon-**shaped nails (koilonychia), which is often associated with iron-deficiency anemia. No such cases were observed in Ri-Muliang.Regardingskin-related symptoms, hyperpigmented skin was more common in Nongstoin(7.04%) compared to Ri-Muliang(5.85%), potentially indicating deficiencies in certain B-complex vitamins or chronic skin stressors. Additionally, dry and scalyskin (0.66%)andcombined hyperpigmentation with dry and scaly skin (0.13%) were reported exclusively from Nongstoin, further suggesting regional variations in nutrient intake or environmental exposure.In the examination of the eyes and mouth, certain clinical signs were noted only in Nongstoin: photophobia (0.13%), cheilosis (cracking or sores at the corners of the mouth, 0.13%), anddecreased taste or smell (0.13%). These symptoms could be linked to deficiencies in vitamin A, riboflavin, or zinc. No such symptoms were observed in the Ri-Muliang population, possibly reflecting differences in dietary diversity or access to micronutrient-rich foods.In terms of thyroid enlargement or neck abnormalities, no clinical signs were observed in either block, suggesting a low prevalence of iodine deficiency disorders or goitre in the studied sample.When assessing symptoms in the extremities, a noticeable proportion of individuals reported bone and joint pain—5.71%in Nongstoin and 1.59% in Ri-Muliang. Similarly, musclepainwas reported by 2.12%of individuals in Nongstoinand1.99%in Ri-Muliang. Furthermore, a subset of individuals experiencedboth bone/joint and muscle pain simultaneously, with2.52% in Nongstoin and**2**.26% in Ri-Muliang affected. These musculoskeletal symptoms may be associated with deficiencies in vitamin D, calcium, or other micronutrients, as well as occupational strain.

While a majority of the population from both Nongstoin and Ri-Muliang Blocks appeared normal in their general clinical assessment, a considerable proportion exhibited subtle yet

important signs of nutritional deficiencies. Nongstoin Block showed a slightly higher incidence of clinicalsymptoms related to skin, mouth, and extremities, suggesting regional variation in nutritional intake or health service access. These findings underscore the need for targeted nutritionalinterventions, community health education, and improved micronutrient supplementationprograms, **p**articularly in rural and underserved areas.

Chapter 5

Anthropometric and Haematological Assessment of Mothers and Children of Nongstoin and Ri – Muliang Blocks of West Khasi Hills:

Part A: Anthropometric and Haematological Assessment of Mothers

Nutritional status of a population is an important tool to study health of any population. We can define nutritional status as "the physical expression of the relationship between the nutrient intake and the physiological requirements of an individual." Nutritional status of a community is the result of the interactions of a wide range of different physical, biological and cultural factors in ecology. It is also one of the indicators of health and well – being of a nation. It mainly depends on the consumption of food in relation to the needs which in turn is influenced by the availability of food and purchasing power (Rao. et al., 2006).

Anthropometry has become a widely used non-invasive and inexpensive practical technique of assessing nutritional status of individual and/or populations especially in clinical and epidemiological studies (WHO, 1995; Mondal, 2014). Anthropometry particularly height and weight are widely accepted simple and reliable means for assessing the nutritional status among mothers than the time consuming bio-chemical test. Studies in this regard reveal that BMI, MUAC, waist and hip circumferences are good indicators of current nutritional status. Protecting women's health during pregnancy, childbirth and the postnatal period is important for maternal health and for this, maternal anthropometry is important in predicting various complications that may occur during pregnancy, such as intrauterine growth retardation and the risk of low birth weight (Casadei. et al., 2022).

The present study was conducted to assess the nutritional status of Mothers (15-49yrs) of Nongstoin and Ri-Mulinag Block of West Khasi Hills of Meghalaya. the findings are demonstrated below:

Table 73. Descriptive Statistics (mean±SD, range) of Anthropometric Variables (Mother)

Anthropometric Variables	Nongstoin (N=172)	Ri –Muliang (N=136)	West Khasi Hills
Height (cm)	148.66±4.99 (132 - 165)	147.42±4.47 (136.5 – 158.5)	148.11±4.80 (132.3 – 165)
Weight (kg)	52.18±10.31 (34.6 – 90)	46.71±7.57 (29.6 – 73.2)	49.76±7.57 (29.96 – 90)
Mid – Upper Arm Circumference	24.53±2.98 (19 – 32.7)	23.16±2.44 (16.4 – 33)[1]	23.93±2.83 (16.4 – 33)[1]
Waist Circumference	76.36±10.85 (58.5 – 116)	71.94±7.24 (57 – 96)[1]	74.4±9.67 (57 – 116)[1]
Hip Circumference	88.33±8.01 (71.5 – 114.8)	82.60±5.64 (68.3 – 102)[1]	85.51±7.61 (68.3 – 114.8)[1]

N.B. (1) Measurement for mid upper arm circumference, hip circumference and waist circumference of one woman from Ri – Muliang block could not be taken because of skin allergy.

The table presented above summarizes the descriptive statistics of key anthropometric measurements among the studied mothers from the Nongstoin and Ri–Muliang blocks of West Khasi Hills District. The findings reveal slight variations between the two blocks in terms of physical parameters.

The mean height of mothers from the Ri–Muliang block was recorded at 147.42 ± 4.47 cm, whereas mothers from the Nongstoin block exhibited a marginally higher average height of 148.66 ± 4.99 cm. This suggests a relatively uniform stature among the mothers across both blocks, with a slightly taller average in Nongstoin.

With regard to body weight, a more noticeable difference was observed. Mothers from the Nongstoin block had a higher mean weight of 52.18 ± 10.31 kg, compared to 46.71 ± 7.57 kg among their counterparts in the Ri–Muliang block. This variation may indicate differences in nutritional status, dietary intake, or lifestyle factors between the two regions.

Similarly, the waist circumference was found to be greater among mothers from Nongstoin, with a mean value of 76.36 ± 10.85 cm, in contrast to those from the Ri–Muliang block. A consistent trend was also noted in the hip circumference, where the average among Nongstoin mothers was 88.33 ± 8.01 cm, significantly higher than the 82.60 ± 5.64 cm recorded for mothers from Ri–Muliang.

These findings collectively indicate that mothers from the Nongstoin block tend to exhibit higher mean values across several anthropometric indicators, which could reflect better overall nutritional or health status when compared to mothers from the Ri–Muliang block. Further investigation into socio-economic, dietary, and lifestyle factors may help explain these inter-block differences.

Table 74: Mean Body Mass Index (BMI) of Mothers by Age Group in West Khasi Hills

Age Group (in years)	Nongstoin (N=172)	Ri – Muliang (N=136)	West Khasi Hills
17 – 27	21.95±3.61 (16.5 – 32.4)	21.5±3.20 (15.0 – 28.3)	22.7±4.04 (15.0 – 32.4)
28 – 38	23.68±4.22 (17.1 – 36.7)	21.29±3.07 (15.1 – 31.1)	22.7±4.06 (15.1 – 36.7)
39 – 49	25.24±5.10 (16.8 – 37.4)	22.91±3.98 (13.1 – 29.1)	22.7±4.05 (13.1 – 37.4)
Total	23.59±4.39 (16.5 – 37.4)	21.48±3.20 (13.1 – 29.1)	22.7±4.04 (13.1 – 37.4)

The table presented above illustrates the age group-wise distribution of the mean Body Mass Index (BMI) among the studied mothers from Nongstoin and Ri–Muliang blocks of West Khasi Hills. The overall mean BMI of mothers from the Nongstoin block was found to be 23.59 ± 4.39, which is comparatively higher than the mean BMI of 21.48 ± 3.20 recorded for mothers from the Ri–Muliang block. This indicates a relatively better nutritional status among the mothers in the Nongstoinblock.When disaggregated by age groups, an interesting trend emerges. In the 39–49 years age group, mothers from Nongstoin reported the highest mean BMI of 25.24 ± 5.10, suggesting a potential age-related increase in body weight, possibly due to metabolic changes or reduced physical activity associated with advancing age. This could also reflect cumulative effects of lifestyle and diet over time.In contrast, the BMI values among mothers from the Ri–Muliang block showed minimal variation across age groups. Specifically, the 17–27 years and 28–38 years age groups exhibited nearly identical mean BMI values, indicating a more uniform nutritional profile across younger and middle-aged women in this block. This uniformity might suggest limited dietary diversity, consistent lifestyle practices, or socio-economic constraints that affect nutritional intake similarly across these age groups.

Overall, the observed differences between the two blocks may be attributed to variations in socio-economic status, access to healthcare and nutrition, education, and other environmental or cultural factors that influence dietary habits and physical well-being.

Table 75: Mean Waist – Hip Ratio (WHR) of Mothers by Age Group in West Khasi Hills

Age Group (in years)	Nongstoin (N=172)	Ri – Muliang (N=135)	West Khasi Hills
17 – 27	0.84±0.07 (0.74 – 0.97)	0.86±0.05 (0.76 – 0.96)	0.85±0.06 (0.74 – 0.97)
28 – 38	0.87±0.05 (0.73 – 1.05)	0.87±0.06 (0.77 – 0.98)	0.87±0.05 (0.73 – 1.05)
39 – 49	0.88±0.07 (0.78 – 1.08)	0.90±0.05 (0.83 – 0.98)	0.89±0.06 (0.78 – 1.08)
Total	0.86±0.06 (0.73 – 1.08)	0.87±0.05 (0.76 – 0.98)	0.87±0.06 (0.73 – 1.08)

N.B. Measurement of waist circumference and hip circumference of 1 woman from Ri – Muliang block could be taken because of skin allergy, 43 women were excluded as they were pregnant.

The table above presents the age group-wise means Waist–Hip Ratio (WHR) among the studied mothers from the West Khasi Hills District. The overall mean WHR for the total sample was 0.87 ± 0.06, suggesting that, on average, the mothers fall within the borderline range for metabolic complications.Thedata reveals that the highest mean WHR was observed among mothers in the 39–49 years age group in both Nongstoin and Ri–Muliang blocks, with values of 0.88 ± 0.07 and 0.90 ± 0.05, respectively. This pattern may indicate an age-related increase in abdominal fat accumulation, which is commonly associated with hormonal changes, decreased physical activity, and metabolic shifts in later life stages.In contrast, the lowest WHR values were recorded in the 17–27 years age group, with a mean of 0.84 ± 0.07 in the Nongstoin block and 0.86 ± 0.05 in the Ri–Muliang block. These lower values among younger mothers are consistent with the natural tendency for a more balanced fat distribution in early adulthood, often associated with higher physical activity levels and metabolic rates.Hence,thetable highlights a gradual increase in WHR with advancing age, underscoring the importance of age-specific interventions to address risks related to central obesity and associated metabolic disorders. It also reflects subtle inter-block variations that may be influenced by lifestyle, dietary patterns, and overall health awareness.

Table 76: Mean Waist – Height Ratio (WHtR) of Mothers by Age Group in West Khasi Hills

Age Group (in years)	Nongstoin (N=172)	Ri – Muliang (N=135)	West Khasi Hills
17 – 27	0.48±0.06 (0.40 – 0.69)	0.48±0.04 (0.41 – 0.58)	0.48± 0.05(0.40 – 0.69)
28 – 38	0.51±0.06 (0.40 – 0.70)	0.48±0.05 (0.39 – 0.63)	0.50±0.06 (0.39 – 0.70)

39 – 49	0.55±0.09 (0.41 – 0.71)	0.52±0.04 (0.44 – 0.58)	0.54± 0.08(0.41 – 0.71)
Total	0.51±0.07 (0.40 – 0.71)	0.49±0.05 (0.39 – 0.63)	0.50±0.06 (0.39 – 0.71)

N.B. Measurement of waist circumference of 1 woman from Ri – Muliang block could be taken because of skin allergy, 43 women were excluded as they were pregnant.

The table above represents the age group-wise distribution of the mean Waist–Height Ratio (WHtR) among the studied mothers from West Khasi Hills District. The overall mean WHtR for the total sample was 0.50 ± 0.06, indicating that, on average, the mothers fall at the threshold commonly used to assess central obesity risk (WHtR ≥ 0.50).The age-wise analysis reveals that mothers in the 17–27 years and 28–38 years age groups from the Ri–Muliang block exhibited nearly identical mean WHtR values of 0.48 ± 0.04 and 0.48 ± 0.05, respectively. These consistent values suggest a relatively stable waist-to-height proportion among younger and middle-aged mothers in this block, possibly reflecting similar patterns of physical activity, dietary intake, or lifestyle.In contrast, the highest mean WHtR was observed in the 39–49 years age group from the Nongstoin block, with a value of 0.55 ± 0.09. This elevated ratio in older mothers may reflect age-related increases in central fat deposition, reduced physical mobility, or long-term cumulative effects of lifestyle and metabolic changes.The findings indicate a general trend of increasing WHtR with age, particularly in the Nongstoin block, which could suggest a higher risk of cardiometabolic complications among older women. The data also underscores the need for targeted health interventions focusing on age-specific risk assessment and nutritional education to mitigate central obesity.

Table 77: Age Group Wise Distribution of Mothers on the Basis of Body Mass Index (BMI) (WHO, 2004)

Nongstoin					Ri – Muliang				
Age Group (in years)	**Underweight (<18.5)**	**Normal (18.5 – 24.9)**	**Overweight (≤25)**	**Total**	**Age Group (in years)**	**Underweight (<18.5)**	**Normal (18.5 – 24.9)**	**Overweight (≤25)**	**Total**
17 – 27	6 (3.48%)	26 (15.12%)	7 (4.07%)	39 (22.67%)	**17 – 27**	10 (7.35%)	39 (28.68%)	6 (4.41%)	55 (40.44%)
28 – 38	9 (5.23%)	61 (35.46%)	30 (17.44%)	100 (58.14%)	**28 – 38**	10 (7.35%)	43 (31.61%)	8 (5.88%)	61 (44.85%)
39 – 49	14 (8.14%)	16 (9.30%)	3 (1.74%)	33 (19.19%)	**39 – 49**	1 (0.73%)	11 (8.09%)	8 (5.88%)	20 (14.71%)
Total	29 (16.86%)	103 (59.88%)	40 (23.25%)	172 (100%)	**Total**	21 (15.44%)	93 (68.38%)	22 (16.18%)	136 (100%)

N.B. Total women = 351, Total studied women = 308, 43 women were excluded as they were pregnant.

The table above illustrates the age-wise distribution of the studied mothers based on their Body Mass Index (BMI), categorized into three distinct age groups: 17–27 years, 28–38 years, and 39–49 years. This classification allows for a clearer understanding of nutritional trends and BMI variations across different stages of reproductive life.

In the Nongstoin block, 16.86% of the mothers were categorized as underweight, while a comparatively higher proportion (23.25%) were overweight, irrespective of age group. A majority of the mothers (59.88%) fell within the normal BMI range, suggesting an overall moderate nutritional status among the population. The consistently high frequency of mothers with normal BMI across all age groups indicates a relatively balanced nutritional intake and health awareness among the community. However, the age group of 28–38 years showed a notably higher prevalence of overweight mothers (17.44%) compared to the other age groups. This could be attributed to reduced physical activity, post-pregnancy weight retention, or lifestyle-related factors commonly observed in this middle reproductive age group. Additionally, the 39 – 49 years age group showed the highest proportion of underweight mothers (8.14%), which may suggest disparities in nutritional access, workload, or underlying health issues such as anemia or chronic infections.

In the Ri-Muliang block, 68.38% of the mothers were found to have normal BMI, while 15.44% were underweight and 16.18% were overweight. The higher percentage of normal BMI compared to the Nongstoin block may reflect better access to balanced nutrition or health services in this region. Similar to Nongstoin, mothers with normal BMI were consistently more frequent across all age groups, reinforcing the idea of a generally stable nutritional environment. Interestingly, the percentage of underweight mothers remained constant (7.35%) in both the 17–27 and 28–38 years age groups, possibly indicating persistent nutritional challenges faced by younger women. Furthermore, the overweight category showed identical prevalence (5.88%) in the 28–38 and 39–49 years age groups. This pattern could be a result of cumulative weight gain over the years due to age-related metabolic changes and declining physical activity levels.

Overall, the observed patterns suggest that while the majority of mothers maintain a normal BMI, there are pockets of both undernutrition and overnutrition that vary with age and location. These findings highlight the importance of age- and region-specific nutritional interventions to address the double burden of malnutrition.

Table 78: Age Group wise Distribution of Mothers on the Basis of Mid Upper Arm Circumference (Tang et al. 2020)

Nongstoin				Ri – Muliang			
Age Group (in years)	Normal (≥24 cm)	Undernutrition (<24)	Total	Age Group (in years)	Normal (≥24 cm)	Undernutrition (<24)	Total
17 – 27	16 (9.30%)	23 (13.37%)	39 (22.67%)	17 – 27	14 (10.37%)	40 (29.63%)	54[*] (40%)
28 – 38	55 (31.98%)	45 (26.16%)	100 (58.14%)	28 – 38	26 (19.26%)	35 (25.93%)	61 (45.19%)
39 – 49	24 (13.95%)	9 (5.23%)	33 (19.19%)	39 – 49	12 (8.88%)	8 (5.93%)	20 (14.81%)
Total	95 (55.23%)	77 (44.77%)	172 (100%)	Total	52 (38.52%)	83 (61.48%)	135 (100%)

N.B. Total women = 351, Total studied women = 307, 43 women were excluded as they were pregnant, *1 woman is excluded because of skin allergy

The table above represents the age-wise distribution of mothers based on their Mid-Upper Arm Circumference (MUAC), which serves as a reliable anthropometric indicator of nutritional status, particularly in resource-constrained settings.

In terms of overall nutritional status, the Nongstoin block recorded a higher prevalence of mothers with normal MUAC (55.23%) compared to the Ri-Muliang block (38.52%). This suggests that mothers in Nongstoin may have relatively better access to nutrition, health awareness, or healthcare services. On the other hand, the proportion of undernourished mothers was significantly higher in Ri-Muliang (61.48%) than in Nongstoin (44.77%), indicating potential nutritional deficiencies and socio-economic disparities in the region.When the data is further analyzed by age group, an interesting pattern emerges. In the 39–49 years age group, both blocks reported a nearly equal prevalence of undernutrition, with 5.23% in Nongstoin and 5.93% in Ri-Muliang. This similarity may suggest that older mothers across both regions experience common age-related physiological and metabolic changes that affect nutritional status, regardless of location.

In the youngest age group (17–27 years), the prevalence of undernutrition was substantially higher in Ri-Muliang (29.63%) compared to Nongstoin (13.37%). This could be due to early marriages, adolescent pregnancies, and lower health and nutrition literacy among young women in Ri-Muliang. These factors often lead to inadequate maternal nutrition during critical stages of growth and reproduction.Conversely, in the 28–38 years age group, a higher proportion of undernourished mothers was observed in Nongstoin (26.16%) compared to Ri-Muliang (25.93%). Though the difference is marginal, it may reflect increased physical workload,

nutritional neglect due to caregiving responsibilities, or possible gaps in maternal nutrition services during the peak reproductive years in the Nongstoin region.

Overall, the data highlights regional and age-specific variations in maternal nutritional status. These variations underscore the need for targeted nutritional interventions, especially for younger mothers in Ri-Muliang and women in their peak reproductive years in Nongstoin. Addressing these issues through community-based programs, nutritional education, and improved access to maternal health services could significantly improve maternal health outcomes in both blocks.

Table 79: Age Group Wise Distribution of Mothers on the Basis of Waist Circumference (WHO, 2011)

	Nongstoin					Ri – Muliang			
	Increased (≥80)					**Increased (≥80)**			
Age Group (in years)	**Moderately Increased (80.1 – 87.9)**	**Substantially Increased (>88)**	**Normal (<80)**	**Total**	**Age Group (in years)**	**Moderately Increased (80.1 – 87.9)**	**Substantially Increased (>88)**	**Normal (<80)**	**Total**
17 – 27	6 (3.49%)	3 (1.74%)	30 (17.44%)	39 (22.67%)	**17 – 27**	1 (0.74%)	3 (2.22%)	50 (37.03%)	54[*] (40%)
28 – 38	70 (40.70%)	18 (10.47%)	12 (6.98%)	100 (58.14%)	**28 – 38**	2 (1.48%)	4 (2.96%)	55 (40.74%)	61 (45.19%)
39 – 49	5 (2.91%)	11 (6.39%)	17 (9.88%)	33 (19.19%)	**39 – 49**	1 (0.74%)	4 (2.96%)	15 (11.11%)	20 (14.81%)
Total	81 (47.09%)	32 (18.60%)	59 (34.30%)	172 (100%)	**Total**	4 (2.96%)	11 (8.15%)	120 (88.88%)	135 (100%)

N.B. Total women = 351, Total studied women = 307, 43 women were excluded as they were pregnant, *1 woman is excluded because of skin allergy.

The table above presents the distribution of mothers by age and waist circumference in the studied population of West Khasi Hills. A total of 307 mothers were included in the study—172 from the Nongstoin block and 135 from the Ri–Muliang block. Among them, a

significantly higher proportion of mothers from Ri–Muliang (88.88%) had normalwaist circumference compared to those from Nongstoin. In contrast, a considerable percentage of mothers from Nongstoin showed increased waist circumference, with 47.09% having moderately increased and 18.60% having substantially increased measurements—both notably higher than those observed in Ri–Muliang.

Age-specific comparisons further highlight this disparity. Among mothers aged 28–38 years, 40.70% of those in the Nongstoin block exhibited moderately increased waist circumference, whereas only 2.96% of mothers in the same age group from Ri–Muliang had substantially increased waist circumference. Similarly, in the 39–49 years age group, 6.39% of mothers from Nongstoin had substantially increased waist circumference compared to 2.96% in Ri–Muliang. These findings suggest a relatively higher prevalence of abdominal obesity among mothers in Nongstoin block, particularly in the middle-aged groups, potentially indicating underlying lifestyle or dietary differences between the two blocks.

Table 80: Age Group Wise Distribution of Mothers on the Basis of Waist – Hip Ratio (WHO, 2011)

Nongstoin				Ri – Muliang			
Age Group (in years)	**Normal (≤0.85)**	**Risk (>0.86)**	**Total**	**Age Group (in years)**	**Normal (≤0.85)**	**Risk (>0.86)**	**Total**
17 – 27	26 (15.12%)	13 (7.56%)	39 (22.67%)	**17 – 27**	25 (18.52%)	29 (21.48%)	54* (40%)
28 – 38	48 (27.91%)	52 (30.23%)	100 (58.14%)	**28 – 38**	24 (17.77%)	37 (27.41%)	61 (45.19%)
39 – 49	12 (6.98%)	21 (12.21%)	33 (19.19%)	**39 – 49**	3 (2.22%)	17 (12.59%)	20 (14.81%)
Total	86 (50%)	86 (50%)	172 (100%)	**Total**	52 (38.52%)	83 (61.48%)	135 (100%)

N.B. Total women = 351, Total studied women = 307, 43 women were excluded as they were pregnant, *1 woman is excluded because of skin allergy.

The above table shows the distribution of mothers by age group and waist – hip ratio. In the present study 61.48% of mothers from Ri – Muliang block had higher waist hip ratio which denotes the risk of getting metabolic complications. While in case of Nongstoin

block equal percentages (50%) of mother had fallen under the category of normal or at risk for any metabolic complications. Also it is apparent from the table that in all the age groups from Ri – Muliang block and the age groups of 28 – 38 years and 39 – 49 years in Nongstoin block, a significantly higher number of mothers had higher waist – hip ratio signifying an alarming situation.

Table 81: Age Group Wise Distribution of Mothers on the Basis of Waist – Height Ratio (Hsieh and Muto, 2003)

Nongstoin				Ri – Muliang			
Age Group (in years)	Normal (≥0.5)	Risk (<0.5)	Total	Age Group (in years)	Normal (≥0.5)	Risk (<0.5)	Total
17 – 27	26 (15.12%)	13 (7.56%)	39 (22.67%)	17 – 27	27 (20%)	27 (20%)	54[*] (40%)
28 – 38	49 (28.48%)	51 (29.65%)	100 (58.14%)	28 – 38	23 (17.04%)	38 (28.15%)	61 (45.19%)
39 – 49	11 (6.39%)	22 (12.79%)	33 (19.19%)	39 – 49	14 (10.37%)	6 (4.44%)	20 (14.81%)
Total	86 (50%)	86 (50%)	172 (100%)	Total	64 (47.41%)	71 (52.59%)	135 (100%)

N.B. Total women = 351, Total studied women = 307, 43 women were excluded as they were pregnant, *1 woman is excluded because of skin allergy.

The above table represents the distribution of mothers based on their waist – height ratio. In the present study 52.59% of mothers from Ri – Muliang block had higher waist – height ratio which denotes the risk of getting centrally adiposed. While in case of Nongstoinblock equal percentages (50%) of mother had fallen under the category of normal or at risk for getting centrally adiposed. In case of both Nongtoin and Ri – Muliang block it is to be noted that higher numbers of mothers i.e., 51 (29.65%) from Nongstoin block and 38 (28.15%) from Ri – Muliang block under the age group of 28 – 38 years were more prone to central adiposity signifying a tendency of developing several health problems among them.

Table 82: Age group Wise Distribution of Mothers on the Basis of Random Blood Glucose Category (American Diabetes Association, 2022)

Nongstoin					Ri – Muliang				
Age Group (in years)	Normal (<140)	Pre – Diabetic (140 – 199)	Diabetic (>200)	Total	Age Group (in years)	Normal (<140)	Pre – Diabetic (140 – 199)	Diabetic (>200)	Total
17 – 27	34 (20%)	3 (1.76%)	1 (0.59%)	38* (22.35%)	17 – 27	50 (36.76%)	5 (3.68%)	0 (0.00%)	55 (40.44%)
28 – 38	87 (51.18%)	12 (7.06%)	1 (0.59%)	100 (58.82%)	28 – 38	53 (38.97%)	8 (5.88%)	0 (0.00%)	61 (44.85%)
39 – 49	25 (14.71%)	7 (4.12%)	0 (0.00%)	32*(18.82%)	39 – 49	15 (11.03%)	3 (2.21%)	2 (1.47%)	20 (14.71%)
Total	146 (85.88%)	22 (12.94%)	2 (1.18%)	170 (100%)	Total	118 (86.76%)	16 (11.76%)	2 (1.47%)	136 (100%)

N.B. Total women = 351, Total studied women = 306, 43 women were excluded as they were pregnant, *2 women is excluded because they did not allowed to do random blood glucose.

The table above illustrates the age group-wise distribution of mothers based on their random blood glucose (RBG) categories in the Nongstoin and Ri–Muliang blocks of West Khasi Hills. Out of the total 306 mothers studied, 264 (approximately 86.27%) were classified as normal in terms of blood glucose levels, with 85.88% from Nongstoin and 86.76% from Ri–Muliang. This suggests that the majority of mothers across both blocks fall within the healthy glucose range.

However, a proportion of mothers were identified as pre-diabetic, with a slightly higher prevalence in Nongstoin (12.94%) compared to Ri–Muliang (11.76%). Only a very small number of diabetic cases were reported in both blocks, indicating a relatively low burden of diagnosed diabetes among the studied population.

When analyzed by age groups, a few notable trends emerge. In the 17–27 years age group, Ri–Muliang reported a higher percentage of pre-diabetic cases (3.68%) compared to 1.76% in Nongstoin, suggesting early signs of glycemic risk among young women in that block. Conversely, in the 28–38 years age group, Nongstoin reported a higher proportion of pre-diabetic mothers (7.06%) than Ri–Muliang. A similar pattern was observed in the 39–49 years age group, where Nongstoin again recorded a greater number of pre-diabetic cases compared to Ri–Muliang.These findings suggest a gradual increase in pre-diabetic conditions with advancing age, especially in the Nongstoin block. The differences between the blocks could be attributed to variations in dietary practices, lifestyle

patterns, healthcare access, or genetic predispositions. These insights underline the importance of early screening and preventive health interventions, particularly for women in the middle and older age groups, to mitigate the future risk of type 2 diabetes.

Table 83: Age group Wise Distribution of Mothers on the Basis of Blood Pressure Category (WHO, 2015)

	Nongstoin						Ri - Muliang				
Age Group (in years)	Normal (SBP <120 and DBP <80)	Pre – Hypertension (SBP 120-139 and DBP 80-89)	Hypertension Stage – I (SBP 140-150 and DBP 90-99)	Hypertension Stage – II (SBP ≥160 and DBP ≥100)	Total	Age Group (in years)	Normal (SBP <120 and DBP <80)	Pre – Hypertension (SBP 120-139 and DBP 80-89)	Hypertension Stage – I (SBP 140-150 and DBP 90-99)	Hypertension Stage – II (SBP ≥160 and DBP ≥100)	Total
17 – 27	23 (13.37%)	12 (6.98%)	4 (2.33%)	0 (0.00%)	39 (22.67%)	**17 – 27**	31 (22.96%)	17 (12.59%)	5 (3.70%)	1 (0.74%)	54[*] (40%)
28 – 38	52 (30.23%)	28 (16.28%)	17 (9.88%)	3 (1.74%)	100 (58.14%)	**28 – 38**	36 (26.66%)	16 (11.85%)	6 (4.44%)	3 (2.22%)	61 (45.19%)
39 – 49	12 (6.98%)	12 (6.98%)	6 (3.49%)	3 (1.74%)	33 (19.19%)	**39 – 49**	8 (5.93%)	8 (5.93%)	4 (2.96%)	0 (0.00%)	20 (14.81%)
Total	87 (50.58%)	52 (30.23%)	27 (15.70%)	6 (3.49%)	172 (100%)	**Total**	75 (55.55%)	41 (30.37%)	15 (11.12%)	4 (2.96%)	135 (100%)

N.B. Total women = 351, Total studied women = 306, 43 women were excluded as they were pregnant, *1 women is excluded because of skin allergy.

The table presents the distribution of mothers by age group and blood pressure status across two blocks—Nongstoin and Ri-Muliang. Out of a total of 307 mothers surveyed, 162 (approximately 52.77%) were classified as having normal blood pressure. This suggests that just over half of the women fall within a healthy blood pressure range, while the remaining are at various stages of elevated blood pressure, which could be a matter of concern from a public health perspective.

A significant proportion of mothers were found to be pre-hypertensive, with 30.23% in Nongstoin and 11.12% in Ri-Muliang. This disparity could be attributed to lifestyle differences between the two blocks. Nongstoin, being relatively more urbanized or accessible, might expose women to lifestyle-related risk factors such as higher consumption of processed foods, sedentary behaviors, or psychological stress, which are known contributors to rising blood pressure even before it reaches hypertensive levels.Interestingly, when analyzed by age groups, a reversal of this trend is noticed in the youngest group (17–27 years), where Ri-Muliang had a higher proportion of pre-hypertensive mothers (12.59%) compared to Nongstoin (6.98%). This could indicate early onset of blood pressure irregularities in Ri-Muliang, potentially due to nutritional deficiencies, early childbearing, or limited awareness and access to preventive health measures in more rural settings. In contrast, the older age groups (28–38 years and 39–49 years) showed a higher pre-hypertensive burden in Nongstoin (16.28% and 6.98%) than in Ri-Muliang (11.85% and 5.93%), again pointing toward cumulative lifestyle-related risks over time in semi-urban or peri-urban populations.In the case of Hypertension Stage I, Nongstoin reported a higher overall prevalence (15.70%) compared to Ri-Muliang (11.12%). This difference again reinforces the possibility that environmental and behavioral risk factors are more pronounced in the former. The only age group where Ri-Muliang showed a slightly higher proportion was 17–27 years (3.70%), possibly reflecting early life stressors or unrecognized maternal health issues that are manifesting earlier in life.However, for the age groups 28–38 years and 39–49 years, Nongstoin showed significantly higher prevalence of Stage I hypertension—9.88% and 3.49% respectively. These findings might suggest an age-related progression of blood pressure conditions that become more pronounced with time in populations exposed to higher metabolic and cardiovascular risk factors.Hypertension Stage II cases were relatively rare in both areas, reported in 3.49% of mothers from Nongstoin and 2.96% from Ri-Muliang. Though the numbers are small, their presence cannot be ignored. These cases could be reflective of long-standing unmanaged hypertension or other comorbid conditions, which, if unaddressed, could lead to serious maternal and cardiovascular complications.

The data suggests that while Ri-Muliang might be experiencing early signs of blood pressure irregularities among its younger mothers, Nongstoin shows a clearer trend of increasing blood pressure with advancing age, particularly in pre-hypertension and Hypertension Stage I categories. This may be due to lifestyle transitions, dietary shifts, and changing health behaviors over time.From a public

health standpoint, the findings emphasize the need for age-specific and area-specific interventions. Health education, early screening, dietary counseling, and lifestyle modifications could play a key role in preventing the progression of hypertension among mothers, especially in vulnerable age groups.

Table 84: Age Group Wise Haemoglobin category of Non – Pregnant Women (WHO, 1968)

	Nongstoin					Ri - Muliang					
Age Group (in years)	**Normal (12 gm/dL or higher)**	**Mild Anaemia (11.0 gm/dL - 11.9 gm/dL)**	**Moderate Anaemia (8.0 gm/dL - 10.9 gm/dL)**	**Severe Anaemia (lower than 8.0 gm/dL)**	**Total**	**Age group (in years)**	**Normal (12 gm/dL or higher)**	**Mild Anaemia (11.0 gm/dL - 11.9 gm/dL)**	**Moderate Anaemia (8.0 gm/dL - 10.9 gm/dL)**	**Severe Anaemia (lower than 8.0 gm/dL)**	**Total**
17 – 27	16 (9.41%)	6 (3.53%)	14 (8.24%)	2 (1.18%)	38[*] (22.35%)	**17 – 27**	23 (16.91%)	14 (10.29%)	14 (10.29%)	4 (2.94%)	55 (40.44%)
28 – 38	40 (23.53%)	24 (14.12%)	32 (18.82%)	4 (2.35%)	100 (58.82%)	**28 – 38**	24 (17.65%)	11 (8.09%)	22 (16.18%)	4 (2.94%)	61 (44.85%)
39 – 49	15 (8.82%)	4 (2.35%)	11 (6.47%)	2 (1.18%)	32[*] (18.82%)	**39 – 49**	8 (5.88%)	4 (2.94%)	7 (5.15%)	1 (0.74%)	20 (14.71%)
Total	71 (41.76%)	34 (20%)	57 (33.53%)	8 (4.71%)	170 (100%)	**Total**	55 (40.44%)	29 (21.32%)	43 (31.62%)	9 (6.62%)	136 (100%)

N.B. Total women = 351, Total studied women = 306, 43 women were excluded as they were pregnant, *2 women is excluded because they did not allowed to do haemoglobin test.

The above table illustrates the age group – wise distribution of non – pregnant mothers based on their haemoglobin level categories in the Nongstoin and Ri – Muliang blocks of West Khasi Hills. Out of the total 306 studied mothers, 126 (approximately 41.17%) were classified as normal in terms of haemoglobin level, with 41.76% from Nongstoin block and 40.44% from Ri – Muliang block. This suggests that the majority of mothers across both blocks fall within healthy haemoglobin range.

However, in both the block prevalence of moderate anaemia can be noticed indicating that mothers are anaemic with 33.53% from Nongstoin block and 31.62% from Ri – Muliang block creating a burden in the population.

When analyzed by age groups, it was noticed that in 17 – 27 years age group, Ri – Muliang block reported a higher percentage of mild anaemic cases (10.29%) compared to 3.53% in Nongstoin signifying a risk of low haemoglobin level among them. Conversely, in the 28 – 28 years age group, Nongstoin reported a higher proportion of moderately anaemic mothers (18.82%) than Ri – Muliang. A similar pattern was observed in the 39 – 49 years age group, where Nongstoin again recorded a greater number of moderately anaemic cases compared to Ri – Muliang.

Again, greater percentages of severely anaemic cases were reported from Ri – Muliang block (2.94%) compared to Nongstoin block under the age group 17 – 27 years. Whereas, a more or less equal percentages of mothers from Nongstoin (2.35%) and Ri – Muliang (2.94%) under the age group 28 – 38 years were severely anaemic. Interestingly, in 39 – 49 years age group more mothers i.e.,1.18% from Nongstoin block were severely anaemic than the mothers in the Ri – Muliang block (0.74%).

As there is increased numbers of mothers experiencing anaemia in the age group 28 – 38 years, suggesting that the middle aged mothers are more prone to anaemia which may be because of multiple pregnancies, low birth spacing and dietary practices.

Part B: Anthropometric and Haematological Assessment of Children

The well-being of a child lays the foundation for a healthy and productive future, not just for the individual but for society as a whole. Prioritizing child health ensures optimal physical, cognitive, and emotional development, enabling children to reach their full potential (UNISEF 2008). Neglecting their health, on the other hand, can lead to long-term consequences, hindering their growth, learning abilities, and overall quality of life.

A cornerstone of child health is their nutritional status. Adequate nutrition during childhood is crucial for proper growth, development of the immune system, and cognitive function. Malnutrition, in all its forms – undernutrition, overnutrition, and micronutrient deficiencies – can have detrimental effects (NCDHHS 2025). Undernutrition weakens the immune system, making children more susceptible to infections and increasing morbidity and mortality. It also impairs physical growth and cognitive development, leading to lower educational attainment and reduced productivity in later life. Conversely, overnutrition leads to childhood obesity, which is associated with an increased risk of chronic diseases like diabetes, cardiovascular disease, and certain cancers later in life. Micronutrient deficiencies, often referred to as "hidden hunger," can have profound impacts on development, affecting brain function, vision, and immune responses (CDC 2024).

Assessing the nutritional status of a child is a vital step in ensuring their healthy development. A comprehensive assessment involves a combination of methods, including clinical examination, dietary assessment, biochemical tests, and anthropometry. Anthropometry plays a crucial role in the assessment of a child's nutritional status. It involves the systematic measurement of the human body and its parts. These measurements are then compared to reference data for children of the same age and sex to evaluate their growth patterns and body composition. Researchers from all over the globe, commonly used four anthropometric indicators to access the nutritional status of the children: stunting (low height for age), wasting (low weight for height), underweight (low weight for age) following WHO criteria (below -2 standard deviation) (WHO 1995) and thinness (age and sexspecific BMI) (Cole et al. 2007, Rao et al. 2021).

The present study was conducted to assess the nutritional status of Khasi Children of Nongstoin and Ri-Muliang blocks of West Khasi Hills District of Meghalaya. The findings are demonstrated below:

Table 85: Descriptive Statistics of Anthropometric Variables of Children of Nongstoin and Ri-Muliang Block of West Khasi Hills District of Meghalaya (0-59 Months)

Height							
Nongstoin Block				**Ri-Muliang Block**			
Age Group	**Number**	**Mean**	**Standard Deviation**	**Age Group**	**Number**	**Mean**	**Standard Deviation**
0-11	27	64.60	±7.16	**0-11**	33	64.88	±8.45
12-23	26	76.40	±5.99	**12-23**	34	73.38	±5.61
24-35	25	83.38	±6.61	**24-35**	25	80.79	±3.63
36-47	33	88.03	±4.37	**36-47**	40	88.34	±5.29
48-59	39	98.50	±4.86	**48-59**	65	96.71	±5.29
Total	150	83.74	±13.00	**Total**	197	83.63	±13.15
Weight							
Nongstoin Block				**Ri-Muliang Block**			
Age Group	**Number**	**Mean**	**Standard Deviation**	**Age Group**	**Number**	**Mean**	**Standard Deviation**
0-11	27	7.63	±1.75	**0-11**	33	7.37	±1.74
12-23	26	9.57	±1.26	**12-23**	34	9.19	±1.41
24-35	25	11.47	±2.07	**24-35**	25	10.74	±1.57

Age Group	Number	Mean	Standard Deviation	Age Group	Number	Mean	Standard Deviation
36-47	33	12.68	±1.72	**36-47**	40	12.42	±1.94
48-59	39	14.87	±1.85	**48-59**	65	14.64	±2.10
Total	150	11.60	±3.10	**Total**	197	11.53	±3.26

Mid Upper Arm Circumference

Nongstoin Block				Ri-Muliang Block			
Age Group	**Number**	**Mean**	**Standard Deviation**	**Age Group**	**Number**	**Mean**	**Standard Deviation**
0-11	27	13.61	±1.61	**0-11**	33	12.94	±1.13
12-23	26	13.69	±1.42	**12-23**	34	13.37	±1.07
24-35	25	14.73	±1.44	**24-35**	25	13.96	±0.94
36-47	33	14.89	±1.04	**36-47**	40	14.38	±1.08
48-59	39	15.14	±0.95	**48-59**	65	14.94	±0.98
Total	150	14.49	±1.41	**Total**	197	14.09	±1.27

Head Circumference

Nongstoin Block				Ri-Muliang Block			
Age Group	**Number**	**Mean**	**Standard Deviation**	**Age Group**	**Number**	**Mean**	**Standard Deviation**
0-11	27	42.00	±3.21	**0-11**	33	41.70	±2.35
12-23	26	44.92	±2.23	**12-23**	34	45.61	±1.89
24-35	25	47.05	±1.92	**24-35**	25	46.37	±1.97
36-47	33	47.88	±1.59	**36-47**	40	47.37	±1.71
48-59	39	49.26	±2.31	**48-59**	65	48.64	±2.15
Total	150	46.53	±3.42	**Total**	197	46.41	±3.12

Chest Circumference

Nongstoin Block				Ri-Muliang Block			
Age Group	**Number**	**Mean**	**Standard Deviation**	**Age Group**	**Number**	**Mean**	**Standard Deviation**
0-11	27	43.91	±3.89	**0-11**	33	42.13	±2.66
12-23	26	45.81	±2.55	**12-23**	34	45.05	±2.54
24-35	25	48.31	±2.50	**24-35**	25	46.52	±2.52
36-47	33	49.09	±2.03	**36-47**	40	48.28	±2.03
48-59	39	51.50	±2.41	**48-59**	65	50.44	±2.17

| **Total** | 150 | 48.08 | ±3.80 | **Total** | 197 | 47.18 | ±3.78 |

The above table presents a detail description of descriptive statistics of some anthropometric measurements taken among the studied children from Nongstoin and Ri – Muliang block of West Khasi Hills District.The table revealed that the mean height of children from Ri – Muliang block was recorded as 83.63±13.15cm, whereas, children from Nongstoin block showed a slight increase in their mean height of 83.74±13.00 cm. This suggests that Nongstoin children are slightly taller than Ri – Muliang children. Moreover, the age group wise mean height has demonstrated a significant increase with age in both the blocks. Interestingly, in the age group of 24 – 35 months, children of Nongstoin block showed higher mean height of 83.38±6.61 cm than the Ri – Muliang block showing mean height of 80.79±3.63 cm. Again, in the age group of 48 – 59 months, children of Nongstoin block had a higher mean height of 98.50±4.86 cm than the children of Ri – Muliang block (96.71±5.29 cm).

With regard to body weight, a slight increase was noticed among the children of Nongstoin block with a mean value of 11.60±3.10 kg than the children of Ri – Muliang block with a mean weight of 11.53±3.26 kg. In the age group of 24 – 35 months, Nongstoin children had a higher mean weight of 11.47±2.07 kg than the children of Ri – Muliang block with a mean weight of 10.74±1.57 kg. It is also evident from the table that as the age of children increases mean weight also increases.

Similarly, the mid – upper arm circumference was found to be greater among the children from Nongstoin block, with a mean value of 14.49±1.41 cm, in comparison to those from Ri – Muliang block, where the maximum difference was noticed among the children of age group 48 – 59 months. The head circumference also showed that Nongstoin children had a slight higher mean value of 46.53±3.42 cm than the children of Ri – Muliang block (46.41±3.12 cm). Moreover, in the age group of 12 – 23 months, the children of Ri – Muliangblock had a higher mean value of 45.61±1.89 cm than the children of Nongstoin block. A consistent trend was also noticed in chest circumference, where the average among Nongstoin children was 48.08±3.80 cm, slightly higher than 47.18±3.78 cm recorded for children from Ri – Muliang block.

Table 86: Age Group Wise Distribution of Children of Nongstoin Block according to Stunting (WHO, 2006)

Age group (in months)	Nongstoin Block						
	Normal (-2SD to +2SD)		Moderate Stunting (-3SD & +3SD)		Severe Stunting (Above -3SD & +3SD)		Total
	Boys	Girls	Boys	Girls	Boys	Girls	
0-11	9 (6.0%)	12 (8.0%)	0	2 (1.33%)	2 (1.33%)	2 (1.33%)	27 (18.0%)
12-23	8 (5.33%)	9 (6.0%)	3 (2.0%)	1 (0.67%)	0	5 (3.33%)	26 (17.33%)
24-35	8 (5.33%)	8 (5.33%)	1 (0.67%)	2 (1.33%)	3 (2%)	3 (2.0%)	25 (16.67%)
36-47	11 (7.33%)	10 (6.67%)	5 (3.33%)	1 (0.67%)	4 (2.67%)	2 (1.33%)	33 (22.0%)
48-59	10 (6.67%)	19 (12.67%)	1 (0.67%)	4 (2.67%)	2 (1.33%)	3 (2.0%)	39 (26.0%)
Total	46 (30.67%)	58 (38.67%)	10 (6.67%)	10 (6.67%)	11 (7.33%)	15 (10.0%)	150 (100%)

The above table illustrates the age – wise distribution of studied children of Nongstoin block based on their height – for – age or stunting, categorized into five distinct age group: 0 – 11 months, 12 – 23 months, 24 – 35 months, 36 – 47 months and 48 – 59 months.A total of 150 children were studied and it was found that more girls that are38.67% falls under normal category than boys which accounts for 30.67% of the total studied children. Interestingly, 6.67% of girls and 10.00% of girls were found to be moderately and severely stunted which is also higher than the boys who are 6.67% and 7.33% of the total studied population of children. In case of moderately stunted the percentage is same for both boys and girls. Moreover, it is noted that in the age group of 12 – 23 months

more girls that is 3.33% is severely stunted where no boys are reported as severely stunted of the total studied children in that age group. While, in the age group of 36 – 47 months, more boys than girls that is 3.33% and 2.67% were found as moderately and severely stunted. Also in the age group of 24 – 35 months and 48 – 59 months equal percentages of girls (2.00%) were found as severely stunted.

Finally, it can be said that girls overall performed better than boys in normal height-for-age status.However, once stunted, girls were more prone to severe forms of stunting, especially in early years (12–23 months). on the other hand, boys showed higher vulnerability in moderate and severe stunting during later childhood (36–47 months).Therefore, stunting risks show sex-specific and age-specific patterns that may be influenced by biological, nutritional, or socio-cultural factors.

Table 87: Age Group Wise Distribution of Children of Ri-Muliang Block according to Stunting (WHO, 2006)

Ri-Muliang Block							
Age group (in months)	Normal (-2SD to +2SD)		Moderate Stunting (-3SD & +3SD)		Severe Stunting (Above -3SD & +3SD)		Total
	Boys	Girls	Boys	Girls	Boys	Girls	
0-11	10 (5.08%)	13 (6.60%)	2 (1.01%)	2 (1.01%)	4 (2.03%)	2 (1.01%)	33 (16.75%)
12-23	14 (7.11%)	7 (3.55%)	2 (1.01%)	3 (1.52%)	3 (1.52%)	5 (2.54%)	34 (17.26%)
24-35	5 (2.54%)	10 (5.08%)	1 (0.51%)	1 (0.51%)	2 (1.01%)	6 (3.04%)	25 (12.69%)
36-47	11 (5.58%)	18 (9.14%)	2 (1.01%)	2 (1.01%)	4 (2.03%)	3 (1.52%)	40 (20.30%)
48-59	22	23	3	5	8	4	65

	(11.17%)	(11.67%)	(1.52%)	(2.54%)	(4.06%)	(2.03%)	(32.99%)
Total	62 (31.47%)	71 (36.04%)	10 (5.08%)	13 (6.60%)	21 (10.66%)	20 (10.15%)	197 (100%)

The above table demonstrated the age – wise distribution of studied children of Ri-Muliang Block based on their height – for – age or stunting, categorized into five distinct age group: 0 – 11 months, 12 – 23 months, 24 – 35 months, 36 – 47 months and 48 – 59 months.A total of 197 children were studied and it was found that more girls that are 36.04% falls under normal category than boys which accounts for 31.47% of the total studied children. Here, 5.08% of boys and 6.60% of girls were found to be moderately stunted where the number of girls is higher than the boys of the total studied population of children.Interestingly, in case of severely stunted 10.66% of boys and 10.15% of girls falls under this category where the percentage is little bit higher for boys than girls. Moreover, it is to note that in the age group of 48 – 59 months more boys that is 4.06% were severely stunted than girls that is 2.03% but in the age group of 24-35 months more girls that is 3.04% were severely stunted than boys that is 1.01% who were reported as severely stunted with regard to the total studied children in that age group. Again, in the age group of 12 – 23 months, higher percentages of girls (2.54%) were found to be severely stunted than boys (1.52%). But in the age group of 36 – 47 months boys were reported to be severely stunted than girls with a higher percentage of 2.03%.

In both blocks of West Khasi Hills, a greater percentage of girls fall under the normal category compared to boys, suggesting better overall height-for-age growth among girls. However, when looking at stunting severity, the pattern varies. In the Nongstoin block (150 children), a higher percentage of girls were severely stunted compared to boys, whereas in the Ri-Muliang Block (197 children), a slightly higher percentage of boys were severely stunted than girls. Additionally, the age-specific trends show variations: in the Nongstoin block, severe stunting among girls was prominent in the 12–23 months group, while in Ri-Muliang Block, severe stunting among boys became more evident in the 48–59 months group. Furthermore, in both blocks, girls between 24–35 months displayed higher severe stunting percentages compared to boys, indicating a critical period for girls' growth faltering. Meanwhile, boys showed a higher prevalence of severe stunting during later childhood (36–59 months) in both blocks. Thus, while general trends such as girls performing better in normal growth persist, the dynamics of stunting severity vary between blocks, possibly reflecting differences in environmental, nutritional, or socio-economic factors.

Table 88: Age Group Wise Distribution of Children of Nongstoin Block according to Underweight (WHO, 2006)

Age group (in months)	Nongstoin Block						Total
	Normal (-2SD to +2SD)		Moderate Underweight (-3SD & +3SD)		Severe Underweight (Above -3SD & +3SD)		
	Boys	Girls	Boys	Girls	Boys	Girls	
0-11	11 (7.33%)	12 (8.0%)	0	2 (1.33%)	0	2 (1.33%)	27 (18.0%)
12-23	11 (7.33%)	15 (10.0%)	0	0	0	0	26 (17.33%)
24-35	11 (7.33%)	12 (8.0%)	1 (0.67%)	0	0	1 (0.67%)	25 (16.67%)
36-47	19 (12.67%)	11 (7.33%)	1 (0.67%)	1 (0.67%)	0	1 (0.67%)	33 (22.0%)
48-59	11 (7.33%)	26 (17.33%)	2 (1.33%)	0	0	0	39 (26.0%)
Total	63 (42.0%)	76 (50.67%)	4 (2.67%)	3 (2.0%)	0	4 (2.67%)	150 (100%)

The above table shows the age – wise distribution of children of Nongstoin block of West Khasi Hills District based on weight – for – age or underweight. From the table it can be understood that more girls irrespective of age groups were found to be normal (50.67%) than the boys (42.00%). Whereas, 2.67% of boys were found to be moderately underweight which in higher than the girls (2.00%) and 2.67% of girls were reported as severely stunted where no boys were reported in that category. In the age group of 0 – 11 months 1.33% of girls were reported as moderate and severe underweight only. While in the age group of 24 – 35 months, 0.67% boys were reported as moderately underweight and 0.67% girls were reported as severely underweight. Interestingly, in the age group of36 – 47 months equal percentage of both boys and girls that are 0.67% were found to be moderately underweight.

Table 89: Age Group Wise Distribution of Children of Ri-Muliang Block according to Underweight (WHO, 2006)

Age group (in months)	Normal (-2SD to +2SD)		Moderate Underweight (-3SD & +3SD)		Severe Underweight (Above -3SD & +3SD)		Total
	Boys	**Girls**	**Boys**	**Girls**	**Boys**	**Girls**	
0-11	14 (7.11%)	15 (7.61%)	2 (1.01%)	1 (0.51%)	0	1 (0.51%)	33 (16.75%)
12-23	17 (8.63%)	13 (6.60%)	2 (1.01%)	2 (1.01%)	0	0	34 (17.26%)
24-35	6 (3.04%)	16 (8.12%)	1 (0.51%)	1 (0.51%)	1 (0.51%)	0	25 (12.69%)
36-47	14 (7.11%)	21 (10.66%)	1 (0.51%)	2 (1.01%)	2 (1.01%)	0	40 (20.30%)
48-59	27 (13.70%)	28 (14.21%)	3 (1.52%)	3 (1.52%)	3 (1.52%)	1 (0.51%)	65 (32.99%)
Total	78 (39.59%)	93 (47.21%)	9 (4.57%)	9 (4.57%)	6 (3.04%)	2 (1.01%)	197 (100%)

The above table shows the age – wise distribution of children of Ri-Muliang Block of West Khasi Hills District of Meghalaya based on weight – for – age or underweight. From the table it can be understood that more girls irrespective of age groups were found to be normal (47.21%) than the boys (39.59%). Whereas, similar percentage of both boys and girls were reported as moderately underweight (4.57%) and 3.04% more boys were found to be severely stunted than girls (1.01%). In the age group of 12 – 23 months equal percentages of boys and girls were reported as moderately stunted (1.01%) while neither boys nor girls were found to be severely stunted in that age group. Interestingly, in the age groups of 24 – 35 months and 36 – 47 months 0.51% boys and 1.01% boys were reported as severely stunted while no girls were reported to be stunted in those age groups. Moreover, 0.51% of both boys and girls were found to be moderately stunted in 24 – 35 months, although in 36 – 47 months more girls (1.01%) were found to be moderately underweight than boys (0.51%).

A comparison between the children of Nongstoin Block and Ri-Muliang Block of West Khasi Hills District based on weight-for-age (underweight status) highlights some notable trends. In both blocks, a higher percentage of girls were found to be normal compared to boys — 50.67% in Nongstoin and 47.21% in Ri-Muliang — suggesting better weight status among girls across age groups. However, in terms of moderate underweight, a slight variation was observed: in Nongstoin, boys (2.67%) showed a higher rate than girls (2.00%), while in Ri-Muliang, both boys and girls recorded an equal percentage (4.57%). Regarding severe underweight, Nongstoin Block reported 2.67% of girls as severely underweight, with no boys falling under this category, whereas in Ri-Muliang Block, a higher percentage of boys (3.04%) were severely underweight compared to girls (1.01%). Age-specific patterns also vary: in Nongstoin, underweight cases were more sporadic, with some presence in almost every age group, while in Ri-Muliang, boys showed severe underweight particularly in the 24–35 and 36–47 months groups, with no girls affected severely in these groups. Interestingly, in the 36–47 months age group, both blocks reported more girls being moderately underweight than boys. Overall, while girls generally showed better nutritional outcomes, boys in Ri-Muliang Block appeared more vulnerable to severe underweight, especially as they grew older.

Table 90: Age Group Wise Distribution of Children of Nongstoin Block according to Wasting (WHO, 2006)

Age group (in months)	Normal (-2SD to +2SD)		Moderate Wasting (-3SD & +3SD)		Severe Wasting (Above -3SD & +3SD)		Total
	Boys	**Girls**	**Boys**	**Girls**	**Boys**	**Girls**	
0-11	10 (6.67%)	12 (8.0%)	1 (0.67%)	2 (1.33%)	0	2 (1.33%)	27 (18.0%)
12-23	10 (6.67%)	14 (9.33%)	1 (0.67%)	1 (0.67%)	0	0	26 (17.33%)
24-35	10 (6.67%)	12 (8.0%)	2 (1.33%)	1 (0.67%)	0	0	25 (16.67%)
36-47	18 (12.0%)	12 (8.0%)	2 (1.33%)	1 (0.67%)	0	0	33 (22.0%)
48-59	13	26	0	0	0	0	39

	(8.67%)	(17.33%)					(26.0%)
Total	61 (40.67%)	76 (50.67%)	6 (4.0%)	5 (3.33%)	0	2 (1.33%)	150 (100%)

The above table revealed the age – wise distribution of children of Nongstoin block based on height-for-weight or wasting, which shows that regardless of all age groups more girls (50.67%) were found to be normal than boys (40.67%). Whereas, 6 (4.0%) boys and 5 (3.33%) girls were reported as moderately wasted and 2 (1.33%) girls were reported as severely wasted, which is under the age group 0 – 11 months. It also to note that, no boys were reported as severely wasted in any of the age groups. Again, in the age group of 0 – 11 months, more girls that is 1.33% were reported as moderately wasted than the boys (0.67%). Also in the age group of 12 – 23 months, equal percentages of both boys and girls (0.67%) were found to be moderately stunted. Moreover, in the age group, 24 – 35 months and 36 – 47 months, higher proportion of boys (1.33%) were reported as moderately underweight compared to the girls (0.67%) in those age groups.

Table 91: Age Group Wise Distribution of Children of Ri-Muliang Block according to Wasting (WHO, 2006)

Age group (in months)	Normal (-2SD to +2SD)		Moderate Wasting (-3SD & +3SD)		Severe Wasting (Above -3SD & +3SD)		Total
	Boys	Girls	Boys	Girls	Boys	Girls	
0-11	9 (4.57%)	14 (7.11%)	2 (1.01%)	0	5 (2.54%)	3 (1.52%)	33 (16.75%)
12-23	16 (8.12%)	14 (7.11%)	2 (1.01%)	0	1 (0.51%)	1 (0.51%)	34 (17.26%)
24-35	7 (3.55%)	17 (8.63%)	0	0	1 (0.51%)	0	25 (12.69%)
36-47	15 (7.61%)	23 (11.67%)	1 (0.51%)	0	1 (0.51%)	0	40 (20.30%)

48-59	30 (15.23%)	30 (15.23%)	1 (0.51%)	2 (1.01%)	2 (1.01%)	0	65 (32.99%)
Total	77 (39.09%)	98 (49.75%)	6 (3.04%)	2 (1.01%)	10 (5.08%)	4 (2.03%)	197 (100%)

The above table revealed the age – wise distribution of children of Ri-Muliang Block based on height-for-weight or wasting,which shows that regardless of all age groups more girls (49.75%) were found to be normal than boys (39.09%). Whereas, 6 (3.04%) boys and 2 (1.01%) were found as moderately wasted and 10 (5.08%) boys and 4 (2.03%) girls were found as severely wasted. In the age group 0 – 11 months and 12 – 23 months equal percentage of boys (1.01%) were reported as moderately wasted, similarly in the age groups of 36 – 47 months and 48 – 59 months uniform percentage of boys (0.51%) were reported as moderately wasted. Moreover, in the age group 48 – 59 months more girls (1.01%) were found to be moderately wasted than boys, while no boys and girls were found as moderately wasted in the age group 24 – 35 months, interestingly, in the same age group 1 (0.51%) boy was reported as severely wasted whereas no girls were reported in that age group. Again, in the age group of 0 – 11 months more boys that is 5 (2.54%) were reported as severely underweight than girls who were 1.52% of the studied population of children. Also in the age group 12 – 23 months equal percentage of both boys and girls (0.51%) were found to be severely wasted. Moreover in the age groups of 24 – 35 months, 36 – 47 months and 48 – 59 months, although 4 (2.03%) boys were reported as severely wasted but no girls were found to be wasted in all the mentioned age groups.

The comparison between the children of Nongstoin Block and Ri-Muliang Block, based on height-for-weight (wasting status), reveals several important patterns. In both blocks, a higher percentage of girls were found to be normal compared to boys — 50.67% in Nongstoin and 49.75% in Ri-Muliang — suggesting better overall acute nutritional status among girls. However, when examining wasting categories, some differences emerge. In Nongstoin Block, 4.0% of boys and 3.33% of girls were moderately wasted, while only girls (1.33%) were reported as severely wasted, specifically in the 0–11 months group, and no boys were severely wasted in any age group. In contrast, in Ri-Muliang Block, both moderate and severe wasting were more pronounced among boys: 3.04% boys and 1.01% girls were moderately wasted, while 5.08% boys and 2.03% girls were severely wasted. Age-specific patterns show that in Nongstoin, moderate wasting among girls was slightly higher in the early months (0–11 months), whereas boys showed slightly higher moderate wasting percentages in later age groups (24–47 months). In Ri-Muliang, boys consistently showed wasting across multiple

age groups, including both moderate and severe forms, particularly in the 0–11 months, 24–35 months, and 36–59 months age brackets, with girls showing no cases of severe wasting beyond 23 months. Notably, the burden of severe wasting was substantially higher among boys in Ri-Muliang Block compared to Nongstoin Block, indicating a more severe nutritional vulnerability for boys in that region. Overall, girls consistently exhibited better nutritional outcomes across both blocks, but boys, particularly in Ri-Muliang Block, were found to be at a greater risk for both moderate and severe wasting across several age groups.

Table 92: Age Group Wise Distribution of Children of Nongstoin Block according to Mid Upper Arm Circumference (WHO, 2009)

	Nongstoin Block						
Age group (in months)	**Normal (above 12.5 cm)**		**Moderate (11.5 to 12.5 cm)**		**Severe Acute Malnutrition (less than 11.5 cm)**		**Total**
	Boys	**Girls**	**Boys**	**Girls**	**Boys**	**Girls**	
0-11	10 (6.67%)	12 (8.0%)	0	1 (0.67%)	1 (0.67%)	3 (2.0%)	27 (18.0%)
12-23	10 (6.67%)	11 (7.33%)	1 (0.67%)	2 (1.33%)	0	2 (1.33%)	26 (17.33%)
24-35	11 (7.33%)	12 (8.0%)	1 (0.67%)	1 (0.67%)	0	0	25 (16.67%)
36-47	20 (13.33%)	13 (8.67%)	0	0	0	0	33 (22.0%)
48-59	13 (8.67%)	26 (17.33%)	0	0	0	0	39 (26.00%)
Total	64 (42.67%)	74 (49.33%)	2 (1.33%)	4 (2.67%)	1 (0.67%)	5 (3.33%)	150 (100%)

The above table illustrates the age – wise distribution of studied children of Nongstoin block based on Mid Upper Arm Circumference. For this analysis 150 children were considered. Out of 150 studied children, only 138 children (including 64 boys and 74 girls) were reported as normal, where as 12 children (including 3 boys and 9 girls) were reported as malnourished with varying degree. In case of moderate malnourishment1.33% of boys and 2.67% of girls were identified while 0.67% of boys and 3.33% of girls were identified as severely acute malnourished. Both moderate and severe acute malnourishment showed higher prevalence among girls than boys. In the age group of 0 – 11 months 3 (2.0%) girls were reported as severely acute malnourished which is higher than the boys (0.67%) reported in that age group, also only 1 (0.67%) girl was reported as moderately malnourished while no boy was reported in that age group. Interestingly, under the age group 12 – 23 months, 5 out of 26 children were reported as malnourished. Whereas, in the age group of 24 – 35 months equal proportion of both boys and girls (0.67%) were found to be moderately malnourished while none of the studied children were reported as severely acute malnourished in that age group. Again, in the age groups of 36 – 47 months and 48 – 59 months no studied children were reported as malnourished.

Table 93: Age Group Wise Distribution of Children of Ri-Muliang Block according to Mid Upper Arm Circumference (WHO, 2009)

Ri-Muliang Block							
Age group (in months)	**Normal (above 12.5 cm)**		**Moderate (11.5 to 12.5 cm)**		**Severe Acute Malnutrition (less than 11.5 cm)**		**Total**
	Boys	**Girls**	**Boys**	**Girls**	**Boys**	**Girls**	
0-11	11 (5.58%)	6 (3.04%)	3 (1.52%)	10 (5.08%)	2 (1.01%)	1 (0.51%)	33 (16.75%)
12-23	16 (8.12%)	10 (5.08%)	3 (1.52%)	3 (1.52%)	0	2 (1.01%)	34 (17.26%)
24-35	8 (4.06%)	16 (8.12%)	0	1 (0.51%)	0	0	25 (12.69%)
36-47	17 (8.63%)	23 (11.67%)	0	0	0	0	40 (20.30%)
48-59	33	32	0	0	0	0	65

	(16.75%)	(16.24%)					(32.99%)
Total	85 (43.15%)	87 (44.16%)	6 (3.04%)	14 (7.11%)	2 (1.01%)	3 (1.52%)	197 (100%)

The table represented the age – wisedistribution of studied children of Ri-Muliang Block of West Khasi hills district of Meghalaya on the basis of Mid Upper Arm Circumference. For this analysis 197 children were considered. Out of 197studied children, maximum number of girls (87, 44.16%) was found to be normal than boys (85, 43.15%) and 25 children (including 8 boys and 17 girls) were reported as malnourished with varying degrees. In the age group of 0 – 11 months, out of 33 studied children, 11 (5.59%) girls were categorized as malnourished whereas, 5 (2.53%) boys were categorized as malnourished representing a higher prevalence of malnourishment among girls than boys. Also in the age group of 12 – 23 months equal proportion of both boys and girls that is 1.52% were reported as moderately malnourished while, only 1.01% of girls were reported as severely acute malnourished with no boys reported in that age group. Again in the age group of 24 – 35 months only 1 (0.51%) girl was reported as moderately malnourished. While the age group of 36 – 47 months and 48 – 59 months none of the studied children were reported as malnourished.

The Mid-Upper Arm Circumference (MUAC) analysis of children from Nongstoin and Ri-Muliang Blocks reveals some notable trends in nutritional status. In both blocks, the majority of children were categorized as normal, but a slightly higher proportion of normal children was found in Ri-Muliang (87 girls and 85 boys) compared to Nongstoin (74 girls and 64 boys). Regarding malnutrition, a greater percentage of girls were found to be affected than boys in both blocks, though the prevalence was more pronounced in Ri-Muliang Block, where 25 children (8 boys and 17 girls) were reported as malnourished compared to 12 children (3 boys and 9 girls) in Nongstoin Block. In Nongstoin, moderate and severe acute malnutrition was notably higher among girls (2.67% moderate and 3.33% severe) compared to boys (1.33% moderate and 0.67% severe), while a similar trend was observed in Ri-Muliang, with more girls affected than boys across both moderate and severe categories.

Age-specific patterns show that in both blocks, the 0–11 months age group had the highest burden of severe acute malnutrition, particularly among girls. In Nongstoin, 2.0% of girls were severely wasted compared to 0.67% boys; similarly, in Ri-Muliang, 5.59% of girls and 2.53% of boys were identified as malnourished in the same age group. In the 12–23 months group, both blocks reported moderate malnutrition, but Ri-Muliang showed a slightly higher presence of severe cases among girls (1.01%) than Nongstoin (no severe cases reported for that age group). In the 24–35 months group, moderate malnutrition was present at low and similar rates in both blocks, while in the 36–47 months and 48–59 months groups, no malnourishment was recorded among the studied children of

either block. Overall, while malnutrition remains a concern in both regions, the burden appears slightly higher in Ri-Muliang Block, with a consistent pattern of greater vulnerability among girls across most age groups.

Table 94: Distribution of Studied Children of Nongstoin Block of West Khasi Hills District of Meghalaya based on Haemoglobin Level (WHO, 1968)

Age group (in months)	Non Anaemia (11 g./dL or High)		Mild (10.0-10.9 g./dL)		Moderate (7.0-9.9 g./dL)		Severe (lower than 7 g./dL)		Total
	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	
6-11	0	0	1 (1.12%)	1 (1.12%)	3 (3.37%)	0	0	0	5 (5.62%)
12-23	0	1 (1.12%)	0	3 (3.37%)	5 (5.62%)	2 (2.24%)	0	0	11 (12.36%)
24-35	0	1 (1.12%)	2 (2.24%)	3 (3.37%)	4 (4.49%)	5 (5.62%)	0	0	15 (16.85%)
36-47	4 (4.49%)	6 (6.74%)	4 (4.49%)	4 (4.49%)	6 (6.74%)	2 (2.24%)	2 (2.24%)	0	28 (31.46%)
48-59	3 (3.37%)	10 (11.23%)	3 (3.37%)	1 (1.12%)	4 (4.49%)	8 (8.99%)	0	1 (1.12%)	30 (33.71%)
Total	7 (7.86%)	18 (20.22%)	10 (11.23%)	12 (13.48%)	22 (24.72%)	17 (19.10%)	2 (2.24%)	1 (1.12%)	89 (100%)

N.B. Total studied children=150, 61 children were excluded because their parents did not allow.

The above table showed the distribution of the studied children of Nongstoin block of West Khasi Hills District of Meghalaya based on their haemoglobin level. Out of 89 studied children, only 25 (including 7 boys and 18 girls) were found to be non – anaemic.

11.23% of boys and 13.48% girls were identified as mild anaemic. Moderate anaemia was observed in 24.72% of boys and 19.10% of girls, while severe anaemia affected 2.24% of boys and 1.12% of girls. Except for mild anaemia, both moderate and severe categories showed a higher prevalence among boys and girls. Interestingly, all children in the 6 – 11 months age group were found to be anaemic, though with varying degrees of severity. Among the children aged 12 - 23months, 10 out of 11 were anaemic and in the age group 24 – 35 months, 14 out of 15 children were anaemic. In the age group of 36 – 47 months, 64.28% of children including both boys and girls were anaemic. In the age group of 48 – 59 months, 56.66% of children were found to be anaemic. Therefore, it may be concluded that the frequency of anaemia tends to decrease gradually with increase in age

Table 95: Distribution of Studied Children of Ri-Muliang Block of West Khasi Hills District of Meghalaya based on Haemoglobin Level (WHO, 1968)

Age group (in months)	Non Anaemia (11 g./dL or High)		Mild (10.0-10.9 g./dL)		Moderate (7.0-9.9 g./dL)		Severe (lower than 7 g./dL)		Total
	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	
6-11	1 (0.64%)	0	0	1 (0.64%)	4 (2.55%)	6 (3.82%)	0	0	12 (7.64%)
12-23	4 (2.55%)	0	2 (1.27%)	1 (0.64%)	8 (5.09%)	8 (5.09%)	0	1 (0.64%)	24 (15.29%)
24-35	3 (1.91%)	2 (1.27%)	0	4 (2.55%)	5 (3.18%)	6 (3.82%)	0	0	20 (12.74%)
36-47	6 (3.82%)	5 (3.18%)	5 (3.18%)	7 (4.46%)	5 (3.18%)	8 (5.09%)	0	1 (0.64%)	37 (23.57%)
48-59	12 (7.64%)	12 (7.64%)	8 (5.09%)	9 (5.73%)	10 (6.37%)	8 (5.09%)	0	1 (0.64%)	60 (38.22%)
Total	26 (16.56%)	19 (12.10%)	15 (9.55%)	22 (14.01%)	35 (22.29%)	37 (23.57%)	0	3 (1.91%)	157 (100%)

N.B. Total studied children=197, 40 children were excluded because their parents did not allow.

The above table presents the distribution of studied children from the Ri-Muliang Block of West Khasi Hills District, Meghalaya, based on their haemoglobin levels. Out of 157 studied children (both boys and girls), 26 boys (16.56%) and 19 girls (12.10%) were classified as normal. In contrast, 15 boys (9.55%) and 22 girls (14.01%) were found to be mildly anaemic. In the category of moderate anaemia, nearly equal proportions of boys (22.29%) and girls (23.57%) were observed, indicating that moderate anaemia affects both sexes relatively equally. Interestingly, severe anaemia was only detected among girls (1.19%), while no boys were reported in this category, suggesting a possible greater vulnerability among girls to more severe forms of anaemia.Age-specific analysis further highlights critical insights: among children aged 6–11 months, 11 out of 12 (91.67%) were found to be anaemic with varying degrees of severity, indicating that anaemia begins early in life, possibly due to inadequate iron intake or poor complementary feeding practices. Similarly, in the 12–23 months age group, 20 out of 24 children (83.33%) were anaemic, underlining the critical need for nutritional interventions during this vulnerable weaning period. A similar trend was observed among children aged 24–35 months, where 75% were anaemic, though notably, no cases of severe anaemia were reported, suggesting that while anaemia remains widespread, its intensity may be lower compared to younger age groups. In the 36–47 months age group, 70.27% of children were anaemic, with one girl identified as severely anaemic, emphasizing that anaemia continues to be a major health issue even in older preschool children. Finally, among children aged 48–59 months, 60% were found to be anaemic, with only one girl falling into the severe anaemia category.

Overall, the findings indicate that anaemia is highly prevalent among young children in Ri-Muliang Block, with the highest burden observed in the younger age groups (6–35 months). The presence of severe anaemia exclusively among girls also points towards possible gender-based disparities in nutritional access or health care, which warrants further investigation and targeted intervention strategies.

The haemoglobin distribution among children of Nongstoin and Ri-Muliang blocks of West Khasi Hills District reveals a concerning prevalence of anaemia across all age groups, although some distinct patterns emerge between the two blocks. In Nongstoin Block, out of 89 studied children, only 25 (28.09%) were found to be non-anaemic, with a slightly higher proportion of girls being normal compared to boys. The distribution showed that mild anaemia was more prevalent among girls (13.48%) than boys (11.23%). However, moderate and severe anaemia collectively exhibited a higher occurrence among boys (24.72% moderate and 2.24% severe)

compared to girls (19.10% moderate and 1.12% severe). This suggests that while mild anaemia is more evenly distributed, boys seem to be more vulnerable to more serious forms of anaemia in Nongstoin Block. In contrast, in Ri-Muliang Block, out of 157 studied children, 45 (28.66%) were classified as normal (26 boys and 19 girls), a percentage quite similar to Nongstoin. Mild anaemia affected 9.55% of boys and 14.01% of girls, while moderate anaemia affected boys (22.29%) and girls (23.57%) almost equally. Interestingly, severe anaemia was detected only among girls (1.19%) and not among boys, suggesting a possible greater risk of severe anaemia among female children in Ri-Muliang.Age-wise patterns across both blocks revealed that anaemia is more prevalent in younger age groups and tends to decrease with increasing age. In Nongstoin, all children aged 6–11 months were anaemic, followed closely by very high anaemia rates in the 12–23 months (90.9%) and 24–35 months (93.33%) age groups. Anaemia gradually declined in the older age groups, with 64.28% anaemic in 36–47 months and 56.66% in 48–59 months. Similarly, in Ri-Muliang, the prevalence was highest in the youngest age group (91.67% anaemic at 6–11 months), then slightly decreased with age: 83.33% in 12–23 months, 75% in 24–35 months, 70.27% in 36–47 months, and 60% in 48–59 months. This consistent trend across both blocks suggests that anaemia among young children may be linked to factors such as poor infant and young child feeding practices, limited access to iron-rich foods, and possible recurrent infections, all of which disproportionately impact children during the critical weaning period. Additionally, the gender-based differences between the blocks are noteworthy where in Nongstoin,boys showed a slightly higher prevalence of moderate and severe anaemia.In contrast, Ri-Muliang, girls appeared more vulnerable to severe anaemia, although mild anaemia was somewhat more common among girls as well.

Hence, the overall findings of both blocks of West Khasi Hills district of Meghalaya highlights that the anaemia remains a serious public health problem among the younger children of both Nongstoin and Ri-Muliang blocks. The decreasing trend of anemia was also observed in both blocks. Boys in Nongstoin may be more vulnerable to moderate and severe anaemia, while girls in Ri-Muliang showed a higher risk for severe anaemia.These findings underline the urgent need for early nutritional interventions, especially targeting children under 3 years of age, and possibly gender-sensitive strategies to address severe forms of anaemia.

Summary and Conclusion

The household survey conducted in the Nongstoin and Ri-Muliang blocks of West Khasi Hills District, Meghalaya, reveals that the majority of Khasi households live in semi-pucca structures made from wood, bamboo, and tin, suited to the seismic and ecological conditions of the region. Though electricity and tap water are largely accessible, infrastructural limitations persist in kitchen arrangements, drainage, and sanitation, with nearly half of the households lacking separate kitchens and permanent water supply in toilets. Traditional cooking practices with firewood are still common, and cleaning habits vary depending on flooring material and economic status. Despite limited use of chemical insect repellents, mosquito nets are widely used. While household hygiene is mostly above average, personal hygiene, particularly among women, is well maintained. Menstrual hygiene practices show a mixed use of sanitary pads and cloth, with varied disposal methods. Addiction practices among mothers are highly prevalent, predominantly chewing betel nut and leaf, often with tobacco. These findings underscore the interplay of tradition, resource availability, and economic condition in shaping housing, hygiene, and health behaviors in the region.

The study, conducted in the Nongstoin and Ri-Muliang blocks of West Khasi Hills, Meghalaya, examined maternal and child health among 43 pregnant women and 253 children. A high prevalence of pregnancy-related complications was reported, with nausea, vomiting, and multiple complications being the most common—particularly among women in Ri-Muliang. Most women consulted government health providers, though a few in Nongstoin preferred private facilities due to mistrust in government services. While 94.44% of women received government-issued health cards offering free tests and medicines, some in Nongstoin lacked these benefits. Regarding antenatal visits, the majority adhered to scheduled consultations, though a few, especially in Ri-Muliang, sought care only during complications. Anaemia was prevalent, with moderate anaemia most common, especially among younger women in Ri-Muliang. Most deliveries occurred in government hospitals, though home births were more frequent in Ri-Muliang.Nearly all children were given colostrum, though a few exceptions arose due to maternal or familial factors. Birth weight data showed the majority of children weighed 3.1–4.0 kg, though Ri-Muliang had more low birth weight cases and a higher proportion of children in the 2.1–3.0 kg range.

The study on child feeding and nutritional practices in West Khasi Hills, Meghalaya, reveals significant regional variations between Nongstoin and Ri-Muliang blocks. Exclusive breastfeeding was observed in 23.72% of children, with Ri-Muliang showing a higher prevalence. Nearly half (47.04%) of the children had transitioned to an adult diet, while 28.45% followed a composite diet combining breast milk with semi-solid food. Breastfeeding frequency varied, with structured two-hourly feeding being most common, and Ri-Muliang showing more instances of on-demand and frequent feeding. Composite diets were typically introduced

between 6–10 months, in line with global recommendations, with Ri-Muliang exhibiting better adherence. Homemade semi-solid foods were preferred overwhelmingly (80.56%), while commercialized options were rarely used. Feeding frequency of semi-solid food was mostly three times daily, again higher in Ri-Muliang. Breastfeeding was discontinued at 11 months or later in the majority of cases, with earlier weaning more common in Nongstoin. Supplementary feeding was absent in 58.05% of children, though homemade supplements (23.30%) and commercial products (15.03%) were also used, more frequently in Nongstoin. Medicinal supplementation was received by 69.96% of children, primarily via government health services, indicating an active role of public health interventions in combating micronutrient deficiencies.

The comparative analysis of morbidity and mortality patterns in Nongstoin and Ri–Muliang blocks of West Khasi Hills district revealed a significant burden of non-communicable diseases (NCDs) such as high blood pressure and diabetes among adults, with minor ailments like fever, cough, and cold also being widespread. Ri–Muliang reported higher overall morbidity, especially among children, indicating possible disparities in sanitation and healthcare access. Under-5 mortality was substantial in both blocks, with slightly higher male vulnerability in Ri–Muliang and more female deaths in Nongstoin, while common causes included fever, diarrhoea, and undiagnosed conditions. Adult mortality was predominantly male, with cancer and cardiac arrest emerging as leading causes, particularly in Nongstoin. The findings highlight urgent needs for targeted health interventions, improved diagnostic facilities, gender-sensitive healthcare strategies, and enhanced public health infrastructure in the region.The clinical assessment of 752 individuals from Nongstoin and Ri-Muliang Blocks revealed that while the majority appeared normal, a notable proportion exhibited signs of nutritional deficiencies, with Nongstoin showing slightly higher rates of symptoms related to skin, mouth, and musculoskeletal health.

The comparative analysis of maternal health indicators between the Nongstoin and Ri–Muliang blocks reveals significant regional and age-specific variations in nutritional status and health outcomes among mothers.The mean BMI was higher in Nongstoin (23.59 ± 4.39) compared to Ri–Muliang (21.48 ± 3.20), indicating relatively better nutritional status in the former. Age-wise, BMI tended to increase with age in Nongstoin, especially in the 39–49 years group, while Ri–Muliang displayed uniformity across age groups, possibly due to consistent lifestyle and socio-economic constraints.WHR values also increased with age in both blocks, reflecting an age-related rise in central obesity, with older mothers showing higher values (0.88 in Nongstoin; 0.90 in Ri–Muliang).MUAC analysis showed a higher proportion of mothers with normal MUAC in Nongstoin (55.23%) than in Ri–Muliang (38.52%), while undernutrition was more prevalent in Ri–Muliang (61.48%). The 17–27 years group in Ri–Muliang showed particularly high undernutrition rates (29.63%), potentially due to early marriage and adolescent pregnancies.Waist circumference data highlighted higher abdominal obesity in Nongstoin, especially among mothers aged 28–38 years and 39–49 years, pointing to lifestyle and dietary differences.The majority of mothers had normal blood glucose levels (86.27% overall), though

pre-diabetic conditions were slightly more prevalent in Nongstoin and tended to increase with age.Blood pressure patterns showed that while over half of the mothers were normotensive, pre-hypertension and Stage I hypertension were significantly more prevalent in Nongstoin, particularly in older age groups. Conversely, Ri–Muliang exhibited higher pre-hypertension in the youngest age group (17–27 years), suggesting early risk onset.Only 41.17% of mothers had normal haemoglobin levels. Moderate anaemia was common in both blocks, indicating a widespread burden of anaemia. Notably, Ri–Muliang reported higher rates of severe anaemia in the youngest age group, while moderate anaemia was more frequent among middle-aged mothers in Nongstoin. This age group appears particularly vulnerable, likely due to reproductive demands, inadequate spacing, and dietary insufficiencies.The findings underscore a dual burden of malnutrition—undernutrition and overnutrition—across the study blocks, with age-specific and regional disparities. Nongstoin mothers tend to have higher BMI and WHR, possibly reflecting better access to food but also greater exposure to lifestyle-related health risks. Ri–Muliang mothers, particularly the younger ones, exhibit signs of chronic undernutrition and anaemia, likely due to socio-economic disadvantages and limited access to maternal healthcare.

The present study offers a comprehensive comparative assessment of child growth and nutritional outcomes in two tribal regions of West Khasi Hills District, Meghalaya—Nongstoin and Ri-Muliang blocks. By examining a range of anthropometric indicators including height, weight, MUAC, head and chest circumference, and haemoglobin levels, the study brings to light the subtle but critical variations in child health status across age and gender dimensions.The analysis revealed that children from Nongstoin Block generally showed marginally better anthropometric outcomes than those from Ri-Muliang Block. A consistent pattern of age-wise improvement in height, weight, and MUAC was evident in both blocks. However, nutritional disparities persisted, with boys in Ri-Muliang being more vulnerable to severe stunting, underweight, and wasting, particularly in later childhood (36–59 months). Conversely, girls showed better overall growth trends but faced a higher burden of malnutrition, particularly during infancy (0–11 months), as reflected in MUAC and anaemiastatistics.Anaemia emerged as a significant public health concern, affecting a large proportion of children in both blocks. Alarmingly, over 70% of children in the younger age groups (6–35 months) were anaemic, underlining the vulnerability of children during the weaning and early childhood period. The pattern was particularly severe in boys from Nongstoin, who exhibited higher rates of moderate and severe anaemia, whereas girls in Ri-Muliang were more prone to severe anaemia. These findings may reflect underlying gender disparities, feeding practices, or differential access to healthcare and nutrition.Despite some improvements in older children, the persistent high rates of undernutrition and anaemia in the critical early years signal urgent gaps in child health and nutritional services. The study underscores that while girls generally exhibit better nutritional status across blocks, gendered vulnerabilities exist that warrant targeted attention.

Based on the comprehensive comparative assessment of household conditions, maternal and child health, nutritional status, and morbidity patterns in Nongstoin and Ri-Muliang blocks of

West Khasi Hills, Meghalaya, the present study recommends implementing block-specific, age- and gender-sensitive health and nutrition interventions. Immediate priority should be given to addressing anaemia and chronic undernutrition, particularly among young mothers and children aged 6–35 months, through intensified micronutrient supplementation, improved antenatal and postnatal care, and targeted child feeding programs. Given the widespread reliance on traditional housing and dietary practices, community-based health education focusing on safe cooking methods, menstrual and personal hygiene, and dietary diversification should be strengthened. Public health infrastructure must be upgraded with better diagnostic, maternal, and child healthcare services, especially in Ri–Muliang, which shows consistent signs of socio-economic vulnerability. Lastly, addressing emerging non-communicable diseases and lifestyle-related risks in Nongstoin through preventive screening and health awareness is crucial to manage the growing dual burden of malnutrition and chronic illness.

Therefore, this study underscores the need for a more grounded, ethnic- and region-specific approach to development, particularly in improving the health, hygiene, and sanitation status of the Khasi community in the West Khasi Hills district of Meghalaya. Additionally, this study highlights the need for further research on the prevalence and associated factors of anaemia among mothers and children in the Khasi community of Meghalaya. Despite the implementation of several government schemes, anaemia continues to persist in the region, indicating a need to investigate the barriers to its eradication. Future studies should include dietary analysis and consider deeper socio-economic and cultural factors to better understand the underlying causes and develop more effective, community-specific interventions. Such research would align well with the Government of India's *Anemia Mukt Bharat* Mission, contributing to targeted, community-sensitive strategies for improving maternal and child health outcomes.

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