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NUTRITIONAL INEQUALITIES IN CHILDREN: A REVIEW OF HOW SOCIOECONOMIC POLICIES IN PAKISTAN SHAPE ANATOMY AND GROWTH

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Abstract

Malnutrition is a global issue which means either too much intake of nutrients or fewer intake which further causes physical and mental problems in both early and later life. Under-nutrition means less consumption of nutritious diet that lacks in calories, carbohydrates, proteins and micronutrients. This can cause permanent effects in later life if deficiency occurs in pregnancy period or in first 1000 days of children's life. Sometimes it may be because of high food prices or food insecurity. PEM (kwashiorkor and marasmus) and micronutrient deficiencies are the severe forms of under-nutrition can cause detrimental effects. On the other side, the problem of obesity as over-nutrition is also emerging in developing countries. Early nutrition pattern plays an important role in long term health. In 2013, 51 million children were wasted majorly in Asia and Africa. 99 million children affected with problem of under-weight and 42 million children being overweight globally in 2013. Gender, education, income also plays crucial role in accessing the nutritional care and healthy option. In Pakistan there was 44.15% prevalence of malnutrition especially in rural areas because of low resources and lack of infrastructure with limited access to health. Sindh and Balochistan have higher rate of malnutrition because of low resources. Maternal education and income also impact the child's health as she knows how to run house by taking right decisions. Infant and young child feeding practices with exclusive breastfeeding reduces the rate and risk of malnutrition. To address these issues in Pakistan, government launched different programs including BNP and Ehsaas program providing cash payments with supplements and awareness sessions as well. Later these programs have positive impacts and results in country when compared with areas without these programs. Another program started called basic and economical food basket which assess the food preferences, average income, household sizes and then provide food baskets with adequate foods. Study highlights the quick need of maternal education, equal access to nutritious and safe food for low HDS population. Check and balance on working programs, helping small industries to get better quality of food and spreading awareness about importance of early nutrition and health.

INTRODUCTION

For sustainable and optimal physical and mental health, it is necessary have enough nutrition in early days of life. When nutrients are more or less in diet, both can cause malnutrition and health problems (1, 2). These nutrients can be Calories, Proteins, Carbs, Vitamins and minerals (2). Over-nutrition is result of excess intake of nutrients and less consumption of nutrients can cause under-nutrition (3). Malnutrition is commonly used to describe under-nutrition (3, 4). Lower intake of nutrients during pregnancy can cause permanent physical and mental effects (2). In pregnancy, there is more requirement of nutrients so deficiencies can be occurred (5).

Starvation is intense malnourishment with symptoms short stature, lean body, low energy, inflammation in lower limbs and abdomen (2, 3). Unavailability of high-quality foods imposes under-nutrition as the major reasons are elevated food prices and poverty (2, 6). Absence of breastfeeding also results in numerous diseases including GI diseases, pneumonia and measles (5). Two severe faces of under-nutrition are PEM and dietary deficiencies (4). PEM is Protein energy malnutrition which further consist marasmus (low calories and protein) and kwashiorkor (low protein with some micronutrient deficiencies) (3). Over-nutrition in some developing countries is present along with under-nutrition as obesity (7).

Globally, 51 million children under age of 5 were wasted and 17 million were extremely wasted back in 2013. Severe wasting percentage was 3% and 8% for wasting children in 2013. Two-third of wasted children was from Asia and one-third was from Africa. Similarly, in case of severely wasted children, one third of severely wasted children were from Africa and two third were from Asia (8, 9, 10, 11). Globally, there was an increase in the percentage of over-weight from 11% to 19% in South-eastern Asia and 3% to 7% in between 2000 and 2013. In 2000, there were 32 million children age of 5 were overweight and 42 million in 2013. In numbers, 18 million in Asia, 11 million in Africa, 4 million in Latin America and Caribbean children under age of 5 were overweight (12, 13, 8, 9, 10, 11). Globally, there is decrease in percentage if underweight; 25% to 15% in between 1990 and 2013. Total 99 million children under age of 5 were found in 2013, two-third from Asia and one-third in Africa (8, 9, 10, 11).

Diseases like CVDs and obesity in adulthood depends very much on early growth patterns. These can be observed by alteration in FM and FFM composition of body. For instance, lower birth means lower FFM in childhood as well as in adulthood. Meanwhile accelerated childhood growth can increase risk of obesity and FM with CVDs. Less researches or studies from low-middle income countries found that acute malnutrition and wasting is related and linked to both FM and FFM. Meanwhile stunting means low FFM and point towards or described by short stature. But body composition also depends upon ethnicity in early days for example, Asian population have more FM than European population from birth onwards [14].

Health disproportions have been one of the greatest problems globally and have big dependence on social factors that model the health results. Therefore earning, schooling, sexual category and topography are some major factors that contribute to health results and approach to care and facilities. These problems are even more significant in LMICs like Pakistan where we have no proper healthcare systems, financial constraints and low literacy rate including societal barriers. Rural areas have more of these health issues than urban areas because of less healthcare opportunities and this increases the death and diseases rate. Talking about economical state, which also plays a major role in health outcomes as in Pakistan there are no proper funding for health problems and people have to pay on their own for medical facilities that difficult for them and often forces them to skip these facilities. Education and awareness always go in hand in hand with health as increasing awareness and knowledge increases the health opportunities and approaches including health knowledge. Education impacts the nutritional status as it inspires and encourages people to care about their health status and to get prevention and cure of diseases that reduces the load of chronic diseases. While people with less awareness are likely to have more health disparities

and problems as they do not know that how important is to get treatment and prevention of diseases [15].

The general frequency of malnutrition was almost 44.15%, which included stunting at 38.13%, underweight at 23.04%, and wasting at 8.05%. The frequency of malnutrition among children from without policy protection families was around 43.64% (4D). There is more health security in KPK, Islamabad and Gilgit Baltistan as compared to Sindh and Balochistan as Pakistan have great geographical differences. Some studies indicate high level of malnutrition in children's areas of Sindh and Balochistan than Punjab and KPK. While other studies reveals that malnutrition is high in Sindh and Balochistan than other provinces of Pakistan. The reason behind this is low socio-economic situations in these areas [16].

Contextual Overview: Pakistan

Demographics & Socioeconomic Disparities

The study of the research indicates that the chances of malnutrition are common among children in rural areas than children in urban areas. Moreover, there is less chance of health recovery in children of rural areas. Findings shows that rural areas have more occurrence of malnourishment with urban children have less percentage of impaired growth. This can be due to the reason that urban areas have more facilities and resources to get better care and health advantages than those rural areas that does not have proper medical and health management and poor economic condition that makes the children more susceptible to malnourishment. Many people who deserve to have health insurance card lives in rural areas and have to cover long distances through disturbed and poor pathways and roads to urban areas that have the offices. These problems hinder the way to get better healthcare approaches meanwhile the children in urban areas with health card only have to register and does not have to pay (16).

Income Gaps and Gender Roles

One study indicates that education level of mother plays an important role in child's health. Maternal secondary and higher education especially education related to health decreases the probability of poor health. That's why enhancing mother's knowledge about child's nutrition is crucial. It is ultimate need to focus on mother's education level as it can lower the frequency of child's nutritional inadequacy. The other benefit that those mothers can contribute to financial and income support in homes and can have the power to take better care of health and well-being. Maternal literacy level gave great impact on children nutritional status. This assured women to stay up-to-date about new information, approaches and opportunities related to medical and healthcare services for their children. One study implied that mothers with high knowledge and education levels and are also taking part in financial support in households tends to pay less attention to child and their health. But they are able to buy and afford high quality food and have access to all nutritious food for their family as they are financially strong. These studies compensate the earlier studies. Financially independent and strong women are able to make right choices for their families related to health and opportunities [16].

Infant Feeding Practices

Breastfeeding is highly crucial for nutritional health of infants. It is solely suggested as the vital source of nourishment and antibodies for babies up to 6 months for better health. Breastfeeding also contributes to emotional connection and attachment between mother and child that also emphasizes on continued and effective breastfeeding. The secretion of breast milk is stimulated by oxytocin and prolactin hormone but is also depends upon feeding pattern of child and breast emptying. Different components impact the effective breastfeeding including skin-to-skin contact within 1 hour of delivery of baby that regulates the production of milk stimulating hormones. Breastfeeding behavior strongly depends on maternal education, different birth methods and social or societal components that also effects the mother-child relation and connection. Also depends upon the situation or feelings of mother and baby after delivery. The caesarean mode of birth tends to have less

frequency and span of breastfeeding afterwards. Breastfeeding is essential for babies in low- and middle-income countries as it linked with less malnourishment rate, ARI, GI problems, mental problems and diarrhea. Globally, 51.9% mothers start early feeding and 45.7% baby of 6 months breastfed exclusively [17].

According to WHO and UNICEF, Asian countries and Africa have the highest death rates because of malnourishment. Likewise in Pakistan, the death rate is 61 per 1000 births in under age of 5. Exclusive, optimal and complementary breastfeeding plays an important role in hindering the malnourishment in children under age 2. Malnourished children upon mixed feeding are 1.7 times than those children who breastfed exclusively. Infant and young child feeding guidelines has been issued by UNICEF for proper guidance of feeding practices and awareness. According to NNS 2018, Pakistan has the lowest following of IYFC guidelines especially in Sindh with 52% breastfed children and 17% children on complementary feeding [18].

Policy Landscape

Mother-child malnutrition has been the biggest problem especially in low-income countries. 40% children are stunted under age of 5 in Pakistan. From mother's pregnancy to the first 1000 days of infant is crucial time that provides the special chance to develop to improve health.

- **Benazir Income Support Program (BISP and BNP)**

To reduce the disturbing occurrence of impaired growth in Pakistan Benazir income started nutrition program, Benazir Nashonuma Program (BNP) in association with World Food Program in August 2020. In this program, 9 million deserving undernourished women received cash payments of Rs8500. It was nutritive program for women who were mothers to be and breastfeeding women and their children aged between 6-24 months. This program is currently running in 552 centers in Pakistan and with 31 centers in Sindh. In this program, the participants receive lipid-based supplements with payments depends upon supplement intake, vaccination coverage and attendance in nutritive sessions. The FC workers checks if the participants are taking their supplements and attending the awareness sessions and then transfer their payments after stamping the BNP cards of participants with withdrawal of cash from nearest point after biometric verification. There was a positive result in 3 years of this program as it reduces the occurrence of impaired growth in children of age under 5 from 48.2% to 44.6%. There was 7.5% decrease in stunting condition. It was the comparative data from areas with BNP and from without BNP [19].

Ehsaas Nashonuma Program

There was Ehsaas Nashonuma Program started by Pakistan's government in 2019 to strengthen society and cut down poverty. This came with new technique to fight with poor situation of country about health financial status of health and to deliver equal opportunities for every single person. The main object of this program was to address the basic reason of poverty in society and other societal issues. The Ehsaas program worked exactly on the footsteps of BISP and BNP by giving supplements and money by biometric verification to poor undernourished women and children. This program became the biggest support program in history of country as it started the Ehsaas Emergency Cash Program during Covid-19 and distributed among almost 15 million Pakistani families. It also started Ehsaas Amdan and Ehsaas interest that boost the financial status of country up to some limit. This program proved that it was for both immediate and future requirements. Like BNP or BISP program, the Ehsaas program also had positive effects on financial status and protected the country to become further falling position as the poverty rate was kept on increasing. This programs results in better human health development through Ehsaas Nashonuma and other projects and reduced the rate of impaired growth and malnourishment. With progress this program is facing difficulty as well as it has to confront governmental problems, inadequate program facility in far-away areas and in-proper harmonization between governments of provinces (21).

Food Security Policies

The government of Pakistan is currently focus on food security and almost neglects the nutritional security. Even when there is guidelines provided by FAO, government is still trying to overcome the problem that population does not have basic food. Because all the population does not have the equal access to basic food, that's why government is not paying attention to nutritional security. Also, there is no complete package of foods with nutritional benefits introduced by government to public or public can get access to these foods by themselves. Therefore, a new program started by the name of Basic and Economical Food Basket (BEFB) which was pocket friendly and nutritionally adequate as per FAO guidelines. Unlike previous studies that recommend only ideal types of diets, this program make recommends the preference based and affordable diets which enhances food security as well as nutritional security. Food basket was made on average prices with already existing data. The cost effectiveness was determined by the mediocre household income in Punjab and nutritional content of foods in food basket was explained by nutritionist of WHO, MOP and FAO (21).

Impact of Poverty and Maternal Health on Infant Growth

The growth of child depends upon different elements but the main is good and enough nutrition. Nutrition is not only important for physical growth but it is also important as it provides the basis of good and strong mental health, social skills, enhances the self-confidence and vocabulary skills. Enough amount of nutrients in diet in important during the developmental time of brain and body as minute deficiency of any nutrients during this crucial time can have serious effects on health and brain. Impaired growth of child starts from, intrauterine period when mother is not taking sufficient and adequate amount of required nutrients that are important for mother's and baby's health. The effects of inadequate intake of nutrients and carelessness during pregnancy can be seen after birth of infant when the birth weight of infant is <2500g with further brain under-development and social-emotional difficulties. Beside the restricted intrauterine growth, the consumption of adequate and sufficient intake of nutrients is also important as it lessens the rate of short stature which is explained as genetic thing in many theories. Good financial status also helps in preventing the impaired growth in children. Stunting is the result of intense malnutrition which further links with neurodevelopmental delays, limited scholastic performance, problematic behavior, impaired social development and reduced concentration.

Poor intake of micronutrients such as iron, zinc and iodine also have worse impact on growth and brain skills development [22].

A case study of Punjab, Pakistan's marginalized area examining the prevalence of family socioeconomic hardship and child malnutrition

Household poverty leads to under-nutrition of children [23].Srinivasan and Mohanty also state that [24], A child's nutritional health is impacted by their household deprivation status (HDS). Due to HDS children are malnourished, and as a result they have less capacity of working which promotes the poverty. This situation of malnutrition and poverty is seen for many coming generations [24]. On the other hand, children with good nutritional status show better performance cognitively, socially and emotionally as compared to malnourished children [25]. In Pakistan the percentage of children which are living under the poverty line is 1/3 of the total population [26]. In Pakistan good sanitation facilities are not available to half of the population [27] and almost 42 percent children are not going to the schools for formal education [28]. Therefore, one element reinforces the other, making the malnourished the most endangered group to negative nutritional and physiological consequences [29]. That is why this group of people has less sources of earning and can't afford good healthcare services. During 1997–98 an economic crisis led to the reduction in health facilities in East-Asia (Indonesia) while economic situation in Thailand got better during this period due to many programs of health insurance [30]. So, in order to raise the social and economic standards of homes, it is required to get more resources to give their children, such as nutritious food to

enhance nutritional status and better treatment in the case of any illness. [30]. In the Punjab province of Pakistan, among the 36 districts, only Rahimyar Khan has shown the third-highest rates of child death and malnutrition. [31].

In Rahimyar Khan district, most of the families have to face many hurdles in earnings. That is why, they show low wealth index along with less literacy [9]. Most studies reveal that the malnutrition is due to less earning and bad socioeconomical status. The aims of this study was to find the relation between poor household economy and child malnutrition in villages of Rahimyar Khan (23).

This study affirms that home poverty is an important factor of child nutrition [24, 33], which is in line with Srinivasan and Mohanty [24]. In Rahimyar Khan dangerous high rates of malnutrition were seen. As wasting remains the same while, stunting and underweight decrease as people move from higher to lower levels of poverty. According to gender analysis, underweight and stunting continue to be the most common types of malnutrition in Pakistan where girls experience greater stunting while boys more likely to wasting [32, 34–36].

The results are consistent with research of different institutions of the world that indicate that socioeconomic conditions have a significant impact on children's nutrition. Children from the poorest households are more likely to be underweight and stunted, according to research from India [33] and the Peruvian Andes [34]. According to research**i.** from the UK [38], China [39], Bangladesh [41], Ecuador [40], and Kenya [43], the risk of malnutrition also greatly increases by less income, below standard housing, and limited services. These findings greatly support the opinion that a lack of basic resources and economic hardship are**ii.** basic and important obstacles to children's healthy development. Various studies have shown that home sufferings and poverty are the main reasons of undernutrition in Pakistan. Improper child nutrition and low income are strongly interrelated, according to data from Southern Punjab and Swabi (KPK) [42–45]. During a study which was conducted in rural Sindh, it was found that the**iii.** children from the poorest families were having double wasting and stunting as compared to their affluent counterparts [46]. The nutritional gap between urban and rural regions is highlighted by the fact that urban areas like Lahore show relatively lower rates of stunting and underweight (44, 45).

In addition, socioeconomic difficulties also contribute to food insecurity and poor health conditions. In order to meet daily requirements of food, people in the backward area of Rajanpur were frequently seen eating expired food, while selling wholesome products like milk, eggs, and ghee [47]. Pakistan Poverty Alleviation Fund (2018) ranked Rahimyar Khan as Punjab's fourth poorest district with 44% of its citizens living below the poverty line [48,49]. As almost 40% of Pakistanis live below this cutoff so socioeconomic disparity continues to be a major factor to preschool-aged child malnutrition.

In short, the data shows that social hardship, poverty, and less access to essential services are the main causes of malnutrition in Rahimyar Khan. To solve this major issue, it is urgent to improve household economy, spread understanding of nutrition, and guarantee access to high-quality food and medical treatment to the locals.

Policy analysis & gaps

What policies currently exist?

Government of Pakistan has introduced a number of programs and policy tools which are related to food fortification criteria and infant and mother nutrition:

National nutrition strategy & surveys. In NNS-2018 data was collected about government priorities for wasting, stunting, and micro-nutrient deficiencies which are the basis of the main national evidence. National planning and donor programming are organised by the NNS [50].

Large-Scale Food Fortification (LSFF) initiatives. The UK-funded Food Fortification Programme (FFP) brought some international companies like Mott MacDonald, Nutrition International and local stakeholders to channelize the requirement of wheat flour and edible oils fortification along with empowering miller capacity, premix supply, and regulatory systems [51] [55] [58].

Maternity protection legislation. For the benefit of the mother and child mandatory maternity leave

(e.g., 12 weeks in practice in many industries) is given under Pakistan's labor and maternity legislative framework; under The West Pakistan Maternity Benefit Ordinance. These protective standards are designed by international labor guidelines (ILO).

iv. **Programmatic delivery platforms.** Different nutritional programs are done through donor/NGO initiatives (e.g., WFP small-mill pilots, biofortification via Harvest Plus), government health infrastructure and social protection pilots. [52] [59]

v. **Pakistan Multi-Sectoral Nutrition Strategy (PMNS) 2018–2025.** This strategy takes initiatives to promote coordination among agriculture, health, social protection sectors and education sector [68].

vi. **The National Fortification Alliance (NFA)** Wheat flour and edible oil fortification is done and controlled under NFA at provincial levels [71].

vii. **Breastfeeding Promotion Ordinance (2002)** and the **Protection of Breastfeeding and Child Nutrition Act (2010).** Under this act government advertises by different platforms to regulate marketing of infant formula and support the environments that are breastfeeding-friendly [67].

viii. **The Benazir Income Support Programme (BISP)** and its **Nashonuma Initiative**, launched in collaboration with the World Food Programme, to provide conditional cash transfers and fortified foods to pregnant and lactating women and children under two years [60].

ix. **Provincial food fortification laws**, such as those enacted in Sindh and Khyber Pakhtunkhwa, mandating the fortification of wheat flour and edible oil with iron, folic acid, vitamin A, and D [62, 64, 71].

Why current policies are insufficient?

Main Issue	Summary of Problem	Effect on Nutrition	Refs
Weak Enforcement	Uneven application of fortification laws; small local mills unregulated or under-resourced.	Low fortification coverage in poor areas.	[52], [53], [65]
Poor Policy Integration	Nutrition, WASH, and maternal programs work separately.	Fragmented impact; persistent malnutrition.	[50], [51]
Economic Barriers	High premix costs, no subsidies; fortified foods less affordable.	Low producer compliance and consumer use.	[54], [67]
Weak Breastfeeding Support	Limited maternity leave; few workplace facilities for mothers.	Early breastfeeding cessation; infant undernutrition.	[56], [57]
Monitoring Gaps	Weak QA systems, poor supply chains, limited testing.	Poor compliance data, weak regulation.	[54], [55], [60]
Lack of Equity Focus	Data not disaggregated by wealth or deprivation.	Hidden disparities remain unaddressed.	[50], [53]

Policies effectiveness and achievements:

These regulations show that hunger is now seen as a complex problem. Pakistan has increased premix supply and developed miller capacity for food fortification through partnerships with Nutrition International, GAIN, and FCDO [61, 63, 64]. Fortified wheat flour coverage has risen to more than 60% in metropolitan areas, according to NFA data, and the Nashonuma Program has improved child development metrics in trial regions [71]. Despite the existence of policy frameworks, their execution is nevertheless uneven and disjointed. Vertical initiatives, as opposed to comprehensive social protection plans, are frequently used to address nutrition [68].

Implementation challenges — funding, governance, awareness

- **Funding & financial incentives.** Fortification experiments and program development have been accelerated by external donor support (UK Aid, WFP, Nutrition International); nonetheless, there is a lack of sustainable domestic funding for premix subsidies, lab capacity, and enforcement. Long-term scale up is questionable when project cycles are relied upon. [58] [51].
- **Governance and institutional fragmentation.** There may be coordination gaps and a lack of accountability when fortification duties are distributed across many ministries and provincial departments (food safety, industries, and health). Because of political decentralization, standards are applied differently in each province [55] [54].
- **Low consumer and industry awareness.** Demand is decreased by low maternal literacy and public understanding of the advantages of fortification; mills may also be ignorant of the business arguments for compliance and fortification procedures. Private sector incentives to invest remain weak in the absence of consumer demand [53] [64].
- **Operational corruption & informal markets.** In certain supply chains, poor inspection and procurement procedures allow for persistent non-compliance or poor product labelling. Enforcement is made more difficult by informal markets, which sell unbranded local flour and are not subject to official regulatory inspection [54].

Policy failures:

- Effective policy results are hampered by a number of major issues, including lax enforcement of breastfeeding laws. Despite laws, there is little support for breastfeeding in the workplace, and formula marketing is still allowed with little oversight [66, 67].
- Gaps in funding. Inadequate funding for fortification quality assurance and program monitoring results from federal and provincial nutrition appropriations, which frequently amount to less than 1% of overall health budgets [71, 73].
- Corruption and delays in the bureaucracy. Policy deployment is delayed, particularly in post-18th Amendment contexts, by administrative inefficiencies and a lack of collaboration between federal and provincial ministries [68].
- Insufficient awareness of the community. The efficiency of fortification initiatives is decreased in rural areas because people there frequently lack knowledge about newborn feeding techniques or fortified foods [60, 65, 69].
- Ground realities are disconnected from policy. Logistical limitations, such as unregulated local mills that control flour production in rural areas and are not included in official fortification initiatives, are disregarded by top-down planning [63, 71].
- Inequality of gender. The influence of nutrition programs at the home level is restricted by women's low decision-making authority when it comes to healthcare and food purchasing [69].

Policy disconnects from ground realities

Many strategies are predicated on the idea of a centralized, industrialized food system in which population coverage is attained via the fortification of a few major mills. However, a sizable percentage of rural and peri urban residents in Pakistan depend on locally produced food and tiny local mills. Similarly, workplace lactation assistance and maternal protection laws need to be contextualized to the reality of the informal economy due to employment patterns (huge informal workforce, female involvement in low-paid sectors). As a result, policy frameworks frequently overlook the delivery and fairness challenges that those with the lowest incomes, and she ought to gain the most, experience [52] [65] [57].

Strengthening maternal & infant nutrition policies (short–medium term)

- **Expand and enforce workplace lactation protections.** Modify and put into effect national maternity protection laws to mandate: (a) compensated breastfeeding breaks for at least six months after giving birth, in addition to regular maternity leave; and (b) the provision of private lactation areas and, where practical, safe milk storage. Encourage firms to implement breastfeeding-friendly workplace practices by offering tax credits, recognition, and certification. Test out unique assistance programs for companies in industries with a high percentage of female

employees (health, education, clothing, services) [56] [57].

- **Scale up community breastfeeding support.** Increase the number of community lactation counsellors and fortify the Lady Health Worker (LHW) program to include workplace involvement, home visits, and one-on-one breastfeeding counselling. Teach LHWs to promote breastfeeding-friendly municipal legislation and connect working moms with nearby companies [50].

Food fortification & supplementation strategies (short–long term)

- **Mandate and harmonize fortification standards nationally with provincial implementation plans.** Transition from optional to required fortification for suitable vehicles (oil, salt, and wheat flour) while bolstering the ability of provincial enforcement. To prevent inconsistent compliance, standardise monitoring procedures, standards, and sanctions among provinces [55] [58].
- **Strengthen QA/QC and market surveillance.** Invest in quick field test kits for mixtures and fortified goods, regional laboratory networks, and regular market sampling by regional food safety agencies. To improve accountability and transparency in the sector, provide compliance dashboards [54] [60].
- **Complement fortification with targeted supplementation for infants and pregnant women.** Policy should support evidence-based supplements (iron/folic acid during pregnancy, and vitamin A and other supplements of micro nutrients per national standards) in situations when fortification cannot consistently reach newborns (for example, when they eat little staple flour) [50] [61].

There are several program assessments of fortification pilots and robust national survey data (NNS 2018), however there are few high-quality randomized controlled studies evaluating the direct effects of wheat-flour fortification on newborn development and biomarkers in Pakistani infants. Program assessments have yielded valuable modelling and coverage data, but they have not been able to show causal effects among infants under two in various socioeconomic groups [50] [54] [61]. Program assessments, donor reports, and FACT coverage surveys are a few of the sources. Although these papers are crucial for operational and policy learning, they can lack thorough, peer-reviewed evidence of causality and may highlight suggestions or program accomplishments. I triangulated findings using independent sources wherever available, including as peer-reviewed papers on breastfeeding in the workplace and UNICEF/NNS [50] [53] [57]. There are several subnational differences in Pakistan (province, district, rural/urban). Although national studies offer aggregated estimates, local reality will differ and necessitate district-level evaluation due to areas of severe hardship and informal market conditions (unfortified local flour markets). High-resolution local research cannot be replaced by the current review, which synthesises national and programmatic data [50] [52] [65]. Policies and initiatives for fortification have been changing quickly (new pilot projects, provincial laws). Following this assessment, a few documents and webpages could be modified. For the most up-to-date evaluation, policy modifications and enforcement reports must be continuously monitored [55] [58]. Temporal Restrictions. Food insecurity and malnutrition among kids may have gotten worse as a result of recent economic fluctuations and climatic catastrophes (such the floods in 2022), however the majority of data show situations before or during the COVID-19 pandemic [72]. Behavioural data is limited. Few studies look at behavioural or cultural factors that affect newborn nutrition outcomes, including mother autonomy or feeding taboos [69].

Conclusion

In conclusion, the problem of stunted growth in Pakistan, especially for kids under five in rural regions like Rahimyar Khan, is a critical matter that deserves immediate focus and action. Stunting, waste, and underweight are incredibly common, and they are significantly correlated with socioeconomic characteristics and household deprivation status (HDS). The information presents a clear picture: In rural Rahimyar Khan, 44.15% of children suffer from malnutrition, with the greatest rates found in HDS-1 and HDS-2

families. Child nutrition is significantly impacted by maternal income and education, underscoring the need for focused interventions. The problem is made worse by the inadequate use of exclusive breastfeeding and supplemental feeding techniques. To address these issues, the government has started programs including the Basic and Economical Food Basket (BEFB), Ehsaas Nashonuma, and Benazir Income Support Programme (BISP). Significant obstacles still exist, nevertheless, such as inadequate policy integration, lax enforcement of fortification regulations, low breastfeeding support, and financial barriers to fortified foods. These difficulties highlight the necessity of addressing malnutrition with a thorough and well-coordinated strategy.

Pakistan needs improve food fortification and supplementing techniques, incorporate nutrition into social protection and poverty alleviation initiatives, and fortify regulations pertaining to maternal and newborn nutrition in order to successfully combat malnutrition. Enhancing policy coordination, putting community-level initiatives into action, and raising awareness and encouraging behaviour change are also essential. To have a significant impact, more financing and subsidies, improved monitoring and assessment, and focused interventions for disadvantaged groups are required. The path forward is obvious: nutrition must be Pakistan's top priority, especially for its most vulnerable citizens. The nation can break the cycle of poverty, improve health outcomes, and promote cognitive development by addressing malnutrition. Now is the moment to act, and it will need a team effort from communities, individuals, healthcare professionals, and legislators. Pakistan can guarantee its children and its citizens a healthier and more successful future by cooperating. Policymakers and other stakeholders may use the study's suggestions as a guide to combat malnutrition in Pakistan. It will take a consistent dedication to enhancing socioeconomic, health, and nutritional outcomes to put these ideas into practice. However, there will be significant advantages, including increased economic production, a healthier populace, and a better future for Pakistan's youth.

Ultimately, tackling hunger in Pakistan is a social and economic requirement as well as a moral one. Pakistan may gain a lot from investing in nutrition, including increased productivity and health as well as social and economic advancement. Now is the moment to take action, and the possible benefits make the effort worthwhile.

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