Stunting in conflict setting: an integrative literature review

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Laurea University of Applied Sciences **Abstract**

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Malnutrition causes fifty percent of the under 5-year-olds children's deaths. Stunting is a form of malnutrition that causes irreversible cognitive damage and inhibits normal growth and development. In 2021 there were 149,2 million stunted under-5-year-olds globally. Approximately 25 percent of the world's children do not have a safe childhood, most of these children live in conflict zones. Unsafeness in childhood means an increase in malnutrition. Some 40 percent of children in the Middle East are living in conflict zones.

The goal of this research is to analyse the barriers and solutions for stunting prevention in the Middle East and North Africa region. The purpose of this thesis is to gather interventions that have been successful in reducing stunting prevalence. This thesis identifies the socio-cultural barriers that lead to nutritional choices and presents interventions done in the Middle East and North Africa to prevent stunting.

The integrative literature review was chosen as research method. The data search was conducted with Cinahl, Proquest and Sage journals databases. The key terms used were stunting, stunted, intervention, Middle East, and North Africa. From 6334 peer reviewed articles 25 were selected for this study.

The 25 publications mainly focused on analysing the stunting situation in Palestine, Iran, Yemen, and the stunting prevalence of the refugees living in the neighbouring countries of Syria and Iraq. Low breastfeeding rate and maternal education level were found as barriers. The states may have committed to nutritional interventions, but emerging conflicts have postponed them, and emergency programmes have been taken into action instead. Lack of far-reaching interventions was clear. Instead of focusing on emergency programmes, the focus should be on re-organizing basic health care such as breastfeeding and nutrition counselling.

The COVID-19 pandemic and climate change will add pressure to already difficult stunting situation in the Middle East and North Africa region. The prolonged conflicts need far-reaching nutritional-specific and multisectoral interventions. There is also a need for more research on effectiveness of interventions.

Keywords: stunting, conflict, intervention, Middle East, and North Africa

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1 Introduction

Malnutrition causes fifty percent of the under 5-year-olds children's deaths (Cooper et al. 2019). Conditions in which a person is not having an adequate balance of micro- or macronutrients and therefore are either too short for their age or too underweight for their length are called malnutrition. In addition to undernutrition a malnourished person can suffer from overnutrition such as being overweight and be exposed to non-communicable diseases. (Baker et al. 2018.) Stunting is a form of malnutrition that causes irreversible cognitive damage and shortage in growth. The World Bank estimates that on average a developing country loses 7% of their per capita Gross Domestic Product due to stunting. (The World Bank 2018.) A quarter of the world's children do not have a safe childhood, most of them living in conflict zones. Unsafe childhood means an increase in malnutrition. (Geoghean 2019.) Two thirds of the children suffering from malnutrition live in war-torn countries. The risk of stunting rises in conflict settings due to household food insecurity. One form of war strategy is to deny access to food by destroying agricultural infrastructure and preventing the access to humanitarian food aid. There are multiple nutritional interventions in conflict settings and evaluations of these interventions. The need for evidence-based high-quality research on children's health and nutritional interventions designed to prevent stunting is evident. (Carroll, Lama, Martinez-Brockman & Perez-Escamilla 2017.) Conducting research in a conflict setting has its obstacles. In the context of fragile and conflict afflicted states the lack of monitoring and reporting leads to a lack of robust evidence (Mates, Shoham, Khara & Dolan 2017).

The Middle East and North Africa region has experienced radical changes in the past decade. The so-called Arab Spring occurred in 2011, starting a domino effect of revolutions and led into crises such as the protracted civil wars in the Arabic Republic of Syria and Yemen. Some 40 percent of the children in the Middle East are living in conflict zones (Salarkia, Stromme, Denselow, & Fylkenes 2020). In 2019 the topmost 11 dangerous countries for children had three countries that belong to the Middle East and North Africa area: Iraq, Syria, and Yemen (Salarkia, Stromme, Denselow, & Fylkenes 2020). Stunting prevalence in North Africa is 17,2 % and in the Middle East 15,1% in children under five years of age according to World Health Organization´s statistics. Globally stunting prevalence is 21.9 percent. In the Middle East and North Africa region the total average stunting prevalence has dropped from 22.1 percent to 14.1 percent between 2008 and 2018. (UNICEF, WHO, World Bank Group 2019). There have been successful interventions to reduce stunting in the Middle East and North Africa region, but some countries still face difficulties. Yemen has a stunting prevalence of 46.8 percent followed by Arabian Republic of Syria with prevalence of 27.6 percent and Iraq 22.1 percent (Statista 2021).

Nutritional problems are large scaled. Reducing hunger by half was a global target as the Millennium Development Goals were set in 2000. United Nations states in its agenda 2030 that "By 2030, end all forms of malnutrition, including achieving, by 2025, the internationally agreed targets on stunting and wasting in children under 5 years of age, and address the nutritional needs of adolescent girls, pregnant and lactating women and older persons" (United Nations 2020a). Within four years the target was to reduce stunting from 2012-2025 40 percent, meaning 4 percent annual reduction. By 2017 the reduction rate had been 2.3 percent, which means that without additional contributions the target could not possibly be met. It seems nearly impossible to "end all forms of malnutrition" including stunting by 2030, and WHO discussion paper (WHO 2017) gives a rather bleak vision for the future of stunting reduction: according to the paper it will take more than one more generation to achieve.

The long-lasting consequences of stunting should be better known among people working in crisis related areas, conflict zones or protracted crises, as well as among the people interested in global health. In this thesis the Middle East and North Africa region is used as the example territory of multiple forms of conflict. The study identifies the socio-cultural barriers that lead to poor nutritional choices and presents interventions done in the Middle East and North Africa region to prevent stunting.

2 Background

Length has been the measurement of a child's health status for the past 60 years (Mangasaryan, Arabi & Schultink 2011). Stunting is a form of malnutrition. The first thousand days after fertilization play a key role. Stunting is not growth retardation that only affects the first two years of life. It has tremendous effects on an individual's cognitive capacity, educational outcome, and the risk of non-communicable diseases in later life (Galasso et al. 2016). Some 90 percent of the 195 million under 5-year-old children suffering from stunting in 2010 were living in 36 countries (Fanzo & Pronyk 2011). UNICEF, WHO and the World Bank estimated in 2014 that there were 171 million stunted under 5-year-olds worldwide (Galasso, Wagstaff, Naudeau & Shekar 2016). The same number in 2021 was 149.2 million (WHO 2021). Stunting is diagnosed by measuring the height of a child and comparing it to the World Health Organization´s Child Growth standards. If the outcome is two standard deviations below the median, the child is defined as stunted. (Ghattas et al. 2019.) In other words, stunting is diagnosed when a child's growth is faltered. The number of stunted children globally is calculated with household surveys, which are not performed annually (Galasso et a. 2016).

Stunting is a form of malnutrition that occurs when a child is exposed to undernutrition for a long period of time. Wasting is another form of malnutrition. (Briend, Khara & Dolan 2015.) There are 47 million wasted children worldwide (UNICEF, WHO & WORLD BANK 2020). Wasted children have low weight for their height. Wasting is labelled as acute malnutrition. A child can be both stunted and wasted at the same time. (Briend, Khara & Dolan 2015.) In this thesis the focus is on stunting because of its long-lasting consequences and because it affects three times as many children as wasting.

Undernutrition has an impact on the prefrontal cortex and prolonged malnutrition like stunting has an impact on occipital lobe and motor cortex. These parts of the brain control working memory, vigilance, and locomotor skills. Stunted children have been acknowledged to have lower grades, difficulties with working memory, learning and in tests of vigilance. (Hoddinott, Alderman, Behrman, Haddad & Horton 2013.) Lack of micronutrients such as iodine and iron has an effect on intelligence quotient (Engle & Huffman 2010).

Cognitive problems and low education level leads to lower-paid employment (Galasso et al. 2016). Stunting has a huge impact on primary school graduation statistics: for every 10 percent increase in stunting prevalence there is a 7.9 percent decrease in primary school graduates (Engle & Huffman 2012). Cognitive incompetence is not the only reason for decreased earning: studies show that shorter people earn less. (Galasso et al. 2016.) The distinction in salary between people who have been malnourished in childhood, and people who have not, can be up to 20 percent (Moench-Pfanner, Laillou & Berger 2012). Non-communicable diseases lead to increased healthcare costs and lost in years of potential work. In the end, the

problem of stunting leads to lower a GDP for the country. This makes stunting an enormous problem that the state should address. (Galasso et al. 2016.) The World Bank has examined how much income a state can lose when it is unable to tackle stunting. The loss of income is generally approximately 7 percent, but in South-Asia it is up to 10 percent. (Galasso et al. 2016.)

Along with optimal nutrition during the first years after fertilization a child needs care, stimulation, and social interaction. Lack of care and interaction can lead to cognitive impairment later in life. Childhood stress such as conflicts and emergencies impact on a child's development. (Engle & Huffman 2012.) Conflict affected environment adds post-traumatic stress, anxiety, and depression (Carroll, Lama, Martinez-Brockman & Perez-Escamilla 2017).

Stunting is associated with a double burden of malnutrition (Galasso et al. 2016). Globally there are 38.3 million overweight children, and this has been a growing trend for the past decades (UNICEF, WHO & WORLD BANK 2020). Stunted children tend to gain weight and become obese in later life. Diabetes mellitus and cardiovascular diseases are non-communicable diseases that are often detected in people who have been stunted. (Galasso et al. 2016). Double burden of malnutrition refers to the fact that same community has both stunted and obese children and even stunted child with overweight guardians living in same household. There is a high prevalence of under 5-year-old children, who are both stunted and overweight, 10 million. That means that the child suffers from undernutrition but at the same time receives too much high-energy nutritionally poor food, usually including saturated fats and sugars. The Middle East and North Africa are on the top of the statistics when overweight and obesity prevalenciese are measured. (Ghattas et al. 2019.) Approximately 8.4 percent of the children in the Middle East and 11.3 percent of children in North Africa are overweight (UNICEF, WHO & WORD BANK).

2.1 Nutrition-specific programmes

There are multiple nutrition-specific interventions to prevent stunting such as breastfeeding promotion. Breastfeeding is one of the best investments into a child's health. Mother´s milk is nutrient rich which has positive outcomes on brain development, and enhance immunity and breastfeeding promote a social interaction between the baby and the mother (Engle & Huffman 2010, 187). It could be possible to prevent the death of approximately 800 000 under-5-year-old's if the children were breastfed for a year. Mother´s milk is so immunity enhancing that the probability of dying under six months of age drops to a rate 14 times less than without it. (Diwakar, Malcolm & Naufal 2019.) The worldwide recommendation is to exclusively breastfeed the first half a year of the new-born and then continue breastfeeding along with solid food to up to two years of age (Engle & Huffman 2010). The global exclusive breastfeeding rate for the first six months of life is 39 percent. The Middle East and North Africa region

is statistically at the very bottom when it comes to exclusive breastfeeding: only 26 percent of the children in the region are breastfed exclusively. (Diwakar, Malcolm & Naufal 2019.) Globally breastfeeding promotion interventions such as infant and young child feeding indicators are among the most cost-effective nutrition-specific interventions (Scott et al. 2020). Breastfeeding and conflict is a double-edged sword. On one hand, a conflict adds stress, which reduces breastfeeding in general. On the other hand, lack of formula due to food insecurity caused by a conflict can promote breastfeeding as it is the only option. (Diwakar, Malcolm & Naufal 2019.)

Other nutrition specific interventions are vitamin and micronutrient supplementation, education on complementary feeding, providing complementary food with or without micronutrient fortification and providing complementary food that is high on energy density. (Galasso et al. 2016.) For example, in Jordan a zinc supplementation in wheat programme is mandatory and in Palestine it is voluntary (Brown, Hampridge & Ranum 2010).

There is a clear evidence that these interventions have a positive outcome on child mortality rates and on acute or severe malnutrition. There is no clear data that these interventions would have a big impact on stunting reduction. Even though the interventions do not have a direct impact on the growth of a child, they have positive outcomes in terms of cognitive capacity and the amount of educational years. When the child mortality rate is decreasing, it leads to more workforce in the upcoming years. (Galasso et al. 2016.) Nutrition-based interventions are not expensive. Fortification is said to be one of the most cost-effective interventions. Staple ingredients´ fortification is secure and far-reaching since food and economic crises and changes in diet do not alter the eating habits of such ingredients as maize and wheat. (Moench-Pfanner, Laillou & Berger 2012).

2.2 Nutrition-sensitive programmes

Nutrition-specific programmes focus on individuals' feeding habits and are not proven to be highly impactful in stunting reduction. Nutrition-sensitive programmes affect the root causes of malnutrition such as the price rates of food, healthcare, agriculture, social healthcare and wages, as well as water and sanitation infrastructure. Cash transfer programmes are a form of social welfare that aim to protect the most vulnerable and poor. Home gardening agricultural interventions can have more impact on female empowerment by increasing their income when cultivating nutritious food and poultry. On home gardening, there is lack of evidence on nutrition outcomes on stunting. (Galasso et al. 2016.)

The effectiveness of a stunting intervention is not always clear. The effectiveness can be measured with the decrease of child mortality rates. Vasquez & Daher (2019) analysed in total 17 nutrition-sensitive and nutrition-specific intervention programmes globally. In nutrition-specific interventions long-lasting, from three up to 7 years, interventions including protein or micronutrient supplementation were the most successful even though only half indicated stunting reduction and child mortality reduction. Since stunting is a state occurring after a longer period of time being exposed to micronutrient deficiencies and food insecurity it is very understandable that one-year lasting single-micronutrient interventions or short school meal programmes are not effective. In this study cash-transfer programmes had 67 percent of effectiveness rate. The most successful interventions were multi-sectoral interventions with 100 percent effectiveness rate. These interventions focused on maternal and childcare, infant and child feeding practices, nutrition during pregnancy and scaled up effective nutrition interventions. (Vasquez & Daher 2019.) The impact on women's and child's health plays a key role reducing stunting prevalence and child mortality.

2.3 Scaling Up Nutrition (SUN)

In 2010 it was acknowledged that solving nutritional problems, such as stunting, would acquire multi-sectoral programming. The World Bank then established The Scaling Up Framework, also known as the SUN. The SUN framework aims to tie nutrition together with other policies and programmes such as gender equality, agriculture, food security, social protection, education, water and sanitation and health care. The idea is that nutritional problems cannot be solved alone. Unfortunately, even when this was declared out loud, in almost all 167 states ministry of health is responsible to coordinate multi-sectoral interventions. (Sawadogo-Lewis, King, Aung & Roberton 2021.)

2.4 Water, sanitation, and hygiene interventions (WASH)

Water, sanitation, and hygiene interventions, better known as WASH, have an impact on childhood stunting, diarrhoea, and mortality. WASH - interventions aim to improve water quality: to decrease the use of contaminated water, provide better water infrastructure, and improve sanitation by promoting handwashing. Handwashing especially before preparing food is crucial in order to prevent diseases from spreading. Constructing water infrastructure is not cheap and, the costs might be overbearing in low-income countries. People's commitment to sanitation still needs some improvement. (Galasso et al. 2016.)

Lack of water, sanitation, and hygiene (WASH) interventions causes up to 20 percent of deaths and disability adjusted lives (DALY) of children. Proper handwashing and sanitation infrastructure bring about a diarrhoea reduction of even up to 60 percent. WASH-programmes have been proven to have positive outcomes on child growth. Successful intervention on mal-

nutrition would require both WASH and nutrition multi-sectoral interventions. There are identified barriers that cause disruption in interventions of the WASH-programmes. Such barriers are personnel, funding, and knowledge above all. Employees might find it difficult to work in multiple-sector programmes due to workload and lack of knowledge of other sectors' work. Funding is ring-fenced to either WASH or nutrition programmes and multi-sectoral work becomes impossible because the objectives and goals of the programme are stricter. Third major problem is the educational level of the personnel: the ones working in WASH programmes may not have any knowledge of nutrition and vice versa. There is a need for further research on integrated programmes, the lack of knowledge on what kind of outcomes should be expected from projects is a barrier for the workers to succeed. (Teague, Johnston & Graham 2014.)

2.5 Urbanization

Food security is defined as the possibility to access nutritious food that meets the needs to live a healthy life (Ghattas et al. 2014). The price of the food and purchasing power of the family are key factors endangering food security. In the beginning of 2010, it was predicted that by 2020 the prices of staple ingredients´ would increase for wheat 40 percent, for maize 60 percent and for oil 80 percent (Moench-Pfanner, Laillou & Berger 2012). Urbanization causes pressure on food security. In the Middle East and North Africa region migration has been focusing on outreach districts, where there is no good sanitation infrastructure and on parts of land that has been used for small-scale farming. The migrants do not have enough food and the farmers need to travel long distances to find land to cultivate. Poor road infrastructure and out-of-condition vehicles ruin up to 30 percent of the crops. None of the Middle Eastern countries can produce enough crops to feed the people. The citizens need to rely on governmental food supply policies. This makes access to basic needs, such as food, political. Urbanization changes the working environment: once physically active farmers change working to indoors with less physical activity. Overweight and non-communicable diseases are more common consequences of urbanization. (Galal, Corroon & Tirado 2010.)

2.6 Conflict

Conflict creates negative health effects for the people living in war affected areas and among those who have been forced to flee and displace. Women and children especially suffer from negative health consequences. Conflicts affect nutrition availability, cause stress and anxiety disorders and in the long run add to the ratio of stunting prevalence. Armed conflicts destroy infrastructure. Incomplete infrastructure complicates the access to food, health facilities and both water and sanitation. (Diwakar, Malcolm & Naufal 2019, 3.) Health personnel play an important role in breastfeeding education. When health facilities are hard to reach, breastfeeding practices decline. There was a 17.4 percent increase in breastfeed termination in

conflict settings in Iraq compared to the safer parts of the country. Mental trauma and stress level of the mothers rose during conflict. There has been a misconception that a mother's weight loss and stress produce poor quality milk. This misconception has been transferred to lactating mothers by health care personnel, and humanitarian aid workers, in cases in Jordan and Bosnia- Herzegovina. Breastfeeding withdrawal has also occurred when the previous newborn has died, and the mother has lactated the baby that passed away. (Rabbani, Padhani, Siddiqui, Das & Bhutta 2020.) Resolving misbeliefs would need well-educated professionals in all sectors. This need is a driving factor for this thesis.

Conflict-affected countries need persevering support. Working basic health care is missing in fragile states that are currently in conflict or have had a conflict. Between 2007-2017 developmental aid climbed from 0.5 billion to 3.6 billion US dollars in 25 conflict affected states. Half of the aid was directed to reproductive health care, mainly focusing on HIV and AIDS prevention. Adolescent care, such as mental care, received the lowest amount of the aid, only two percent. Children´s healthcare received one third of the funds and maternal and newborn healthcare 18 percent. The amount of DALYs adjusted to received aid is not linear. For example, one third of the aid allocated to children´s health was channeled to programmes focusing on nutrition deficiency diseases even though these are only a subset of less than ten percent of DALYs among children. And comparably again communicable diseases are responsible for 36.2 percent of adults DALYs but receive funding only 3 percent. Even though the amount of money donated to conflict affected countries has risen it is good to bear in mind, that in most cases it is the only source of income for the healthcare sector. An unstable country does not lure long term investments and most interventions are funded for a short period such as one year. Building and strengthening health care facilities could be more useful for tackling non-communicable diseases and maternal and infant care. (Li, Righter & Lu 2019.)

2.7 The Middle East and North Africa region

According to United Nations Human Rights Office of The High Commissioner (2021) the Middle East and North Africa region consist of the following 19 countries: “Algeria, Bahrain, Egypt, Iran, Iraq, Israel, Jordan, Kuwait, Lebanon, Libya, Morocco, Oman, Occupied Palestinian Territory, Qatar, Saudi Arabia, Syria, Tunisia, United Arab Emirates and Yemen”. The World Bank and UNICEF use the same category for the countries. The World Bank calls the area the Eastern Mediterranean Region and among the 19 countries that are listed above, The World Bank adds Djibouti and Afghanistan (WHO 2021). In this thesis the Middle East and North Africa region covers both definitions.

The Middle East and North Africa region has gone through a lot of social, political, and economic changes in the last twenty years. In the beginning of the 21st century it seemed that the prevalence of malnutrition, including stunting, was descending but since 2006 the prevalence of malnutrition began to rise. Insufficient amount of nutritious food and yet oversupply of poorly nutritious energy rich junk food has led to situations where there are malnourished children, overweight children and sometimes even children who are simultaneously malnousrished and overweight. A double burden of malnutrition can be identified in countries like Iran, Egypt, Lebanon, and the United Arab Emirates. (Ghodsi et al. 2021.) The Middle East and North Africa region hold two thirds of global conflict related deaths between 2013-2017 (World Bank Group 2020) Unstable countries such as Iraq, Yemen, Syria, Palestine, and Afghanistan are raising their children without proper nutritious food due to protracted conflict and war. (Ghodsi et al. 2021.) Prolonged conflicts have led to a situation where countries like Iraq, Yemen and Palestine are on the top of the youngest populations. In Iraq the median age was 19.3 years in 2015. (Diwakar, Malcolm & Naufar 2019.)

Countries that are considered as successful in stunting reduction include Iran as the only state from the Middle East and North Africa region (Galasso et al. 2016). At the same time as Iran has been successful in decreasing stunting prevalence, the prevalence of obesity and overweight in children has risen from 5.5 percent to 15.1 percent in a thirteen-year period. As a result of this unwanted development Iran has banned advertising and food marketing in daycares and schools. Yet still, unhealthy food is often cheaper, and children receive food with low nutritional status. (Babashahi et al. 2021.)

The problems poverty and crisis cause in the area are well recognized, and there are nutritional and other specific programmes in the area to make the end of malnutrition become a reality. Despite, there is little research done on how effective and economically sustainable these interventions are. The success of a nutrition focused intervention relies on recognising the specific needs and background of the area. (Ghodsi et al. 2021.) There is a clear need for an analysis and research of interventions that are and have been operating in the Middle East and North Africa region and for a review of those interventions‘ effectiveness.

3 Method

3.1 Goals, objectives, and research questions

The goal of this thesis is to analyse the barriers and solutions for stunting in the Middle East and North Africa region. The objective of this thesis is to gather interventions that have been successful to reduce stunting and list the obstacles and non-successful projects related to

stunting. An integrative literature review is a chosen method to achieve these goals and find the answers for the following research questions.

1) What kind of successful interventions there have been to prevent stunting in Middle East and North Africa region
2) What kind of barriers have there been in stunting prevention in the Middle East and North Africa region?
3) How do peace and conflict or fragility of the state affect stunting prevalence?

3.2 Literature review

A literature review is a starting point for every study that is made. Previous studies and the knowledge gathered is necessary to develop the theoretical understanding of the subject. The aim of the literature review is to develop the theory of the subject or evaluate current theories. Literature review is used for gaining a comprehensive image of a studied subject. There are multiple different variations on how to conduct a literature review. There are three main review categories: narrative literature reviews, systematic literature reviews and meta-analysis. Narrative reviews describe previous research done. Usually, the review is done with peer-reviewed articles which might be quantitative or qualitative by nature. Systematic reviews on the other hand can be amalgamations of both narrative and systematic research, because originally, they have developed from each other. Systematic reviews find answers to meticulous research questions. PICO- terminology is used to identify previous search methods. Meta-analysis is normally selected as a research method when new theories are conducted. Meta-analysis connects the findings of the previous research and creates new theories. (Stolt, Axelin & Suhonen 2016, 7-16.)

3.3 Integrative literature review

Integrative literature review is a systematic review that has features of narrative review. Integrative literature review can provide new knowledge of already known topics. It is the widest method of reviews and it includes multiple conclusions. The main character of integrative literature review is the wide synthesis of findings. Finding the analogous conclusions can be divergent because integrative literature review combines different kinds of research methods. (Stolt, Axelin & Suhonen 2016, 13.)

All literature reviews are conducted with the same basic elements. The research starts with literature search. The data collected must be critically appraised. The material collected is a base for synthesis and analysis. Integrative literature review is based on process type five step progress. (Stolt, Axelin & Suhonen 2016, 8,13.) The five steps are: 1) identifying the problem and defining the research question 2) search strategy for literature search 3) Data

evaluation 4) Data analyses and 5) Presentation (Whittlemore & Knafl 2005 according to Hopia, Latvala & Liimatainen 2016.)

3.4 Research problem identification and research questions definition

Identifying the problem starts with appraising research question or questions to which the data collected will provide answers. The goal and purpose of the research are the cornerstones that guide the systematic research process. (Sulosaari & Kajander-Unkuri 2016, 111.) The goal of this thesis is to analyse the barriers and solutions for stunting in the Middle East and North Africa region. The purpose of this thesis is to gather interventions that have been successful in reducing stunting and list the obstacles and non-successful projects related to stunting. In this thesis the step one of integrative literature review includes PICO-model and research questions as follows:

P (problem)	What kind of interventions there have been to prevent and reduce stunting in the Middle East and North Africa region
I (intervention)	Successful interventions to prevent stunting in the Middle East and North Africa region
C (comparison)	What kind of barriers there are related to stunting reduction and its prevention in Middle East and North Africa region
O (outcome)	increase knowledge of stunting for all types of people working in areas where stunting occurs, and people interested in global health

Table 1. PICO model for stunting.

The research questions for the integrative literature review:

1) What kind of successful interventions there have been to prevent stunting in the Middle East and North Africa

2) What kind of barriers have there been in stunting prevention in the Middle East and North Africa?

3) How do peace and conflict or fragility of the state affect stunting prevalence?

3.5 Data search strategy

The second step of an integrative literature review is to plan the data search strategy. In an ideal situation there should be two persons conducting the data search. All possible methods to collect all original research papers should be used. First, the key words and combinations

of key words must be defined. Second, the relevant databases must be chosen. There is also the possibility for manual data search. It is highly important to keep track of data search results. There is a need to define inclusion and exclusion criteria for the research. When data collection is done the articles will be checked if they meet the inclusion or exclusion criteria. The eligible articles must be in line with research questions. The data selection process is often presented as a table. (Sulosaari & Kajander-Unkuri 2016, 111.)

The data search was performed between June and September 2021. Assistance for the data search was requested from the senior lecturer of Information Management of Laurea University of Applied Sciences. The lecturer of Information Management was consulted twice before starting the data search to classify the key terms and databases that were used in data search. The databases chosen for the data search were Cinahl, Proquest and Sage Journals. The time frame for the data search was narrowed to 2010-2021. 2010 was chosen as the year of beginning since the focus region was the Middle East and North Africa. Year 2010 marks as a start of a new era for the region since Arab awakening started political unrest and conflicts that are still ongoing as explained in the background section.

Before the actual data search, it is good to do a pilot search (Sulosaari & Kajander-Unkuri 2016, 110). The aim is to understand what kind of research there has been done before and are the key terms corresponding to relevant articles. The key terms were: “stunting” or “stunted” and “Middle East” “Middle East and North Africa”. After the pilot search it was clear that there was a need for country-based keywords. Afghanistan was also elected to be one of the key terms, because it belongs to the World Health Organization´s area definition of Eastern Mediterranean region and has a country profile of prolonged conflict such as many Middle Eastern countries. The final key words were, and the data research process is illustrated in a data search table 1.

Search terms	Database	Hits	Headline	Abstract	Whole text
Stunting or stunted AND Middle East and North Africa	Proquest	4	4	4	3
Stunting or stunted AND Middle East	Proquest	12	6	3	3
Stunting or stunted AND Middle East	Sage Journals	445	39	10	9
Stunting AND Effectiveness	Sage Journals	0	0	-	-
Stunting AND intervention	Sage journals	1586	137	41	30
Stunting AND Iran	Sage Journals	113	9	3	2
Stunting AND Oman	Sage journals	21	5	3	1
Stunting AND Syria	Sage journals	92	6	3	3
Stunting AND Afghanistan	Sage Journals	134	10	8	5
Stunting AND Yemen	Sage Journals	34	8	7	4
Stunting OR stunted OR growth disorder AND Yemen	Cinahl	4	3	2	2
stunting OR stunted OR growth disorder AND Afghanistan	Cinahl	14	1	1	1
Stunting OR stunted AND interventions or strategies or best practices	Cinahl	586	84	48	40
Stunting AND intervention or prevention AND Middle East, OR Afghanistan OR Yemen OR Iraq OR Syria or north Africa	Proquest	3289	238	171	121
TOTAL		6334	550	303	224

Table 2: Data search table

The data search from three different databases produced 6334 hits in total. Based on headline the amount narrowed into 550 hits. Duplicates were removed. All articles chosen by the headline were restored in RefWorks software in files that allocated which key words were used for search. Based on abstract 303 articles were chosen. The abstract needed to include

one or more of the key concepts. The final selection of the research data was done based on full text. 224 articles were selected for a deep full-text analysis. Only full-text and peer-reviewed articles were selected. The selected articles needed to meet inclusion the criteria. Inclusion and exclusion criteria were defined as follows:

Inclusion criteria:

- Publication language: English
- Study population: studies of stunting in Middle East and North Africa region
- Research design: qualitative, quantitative, mixed methods, guidelines, and recommendations for health care workers
- Publication date 2010-2021

Exclusion criteria:

- Publication language: other
- Other forms of malnutrition such as wasting
- Letters to editor, university of applied sciences bachelor's thesis and master's thesis, integrative literacy reviews

Explicit inclusion criteria aim to reduce bias (Hawker, Payne, Kerr, Hardey & Powell 2016). 224 articles 25 articles met the inclusion criteria and were selected.

3.6 Data evaluation

The chosen articles need to be evaluated. There is a quite range writing styles and in the quality of the article. That is why quality assessment of eligible articles is necessary. Sometimes the abstracts are misleading, or the methods of the study are not well explained. Since integrative literature review can consist of multiple different research methods there is a need to grade the reliability and quality of the study. There is no one precise method to do the evaluation but it is important to describe how the evaluation criteria is defined. (Hawker et al. 2016.)

In this thesis the data evaluation was conducted with a one to four score system where one point is the lowest and four points is the highest score. Hawker et al. (2016) present nine categories including evaluation model which has been modified of the purposes for this research. The evaluation criteria are presented in an evaluation criteria table 2.

Subject of evaluation	4 points	3 points	2 points	1 point
Abstract and title	Title and abstract provide accurate picture of article	Abstract has most information	Defective abstract	Abstract missing
Introduction and aim	Adequate background literature review with clearly specified aim and research questions	Little background and literature review and defined research questions	Either background or aim and research questions missing.	Background, literature review, aim and research question missing
Method and data	Method and data collection profoundly explained	Method imperfect and data collection plainly explained	Method and data poorly explained	Method and data missing
Sampling	Details of sampling defined	Some details of sampling given	Sampling is mentioned but details are not defined	Sampling missing
Data analysis	Precise definition of data analysis	Some details of analysis defined	Minimal details of analysis	Analysis missing
Ethics and bias	Inclusive analysis of ethics and bias	Some details of ethics and bias addressed	Minimal description of ethics and bias	Analysis of ethics and bias missing
Findings	Logical finding that are relevant to aims and research questions	Findings are listed and logically explained but the relation between findings and aims is narrowly explained	Findings are listed but not logically. The relation between findings and aims not explained	Findings missing nor irrelevant to aims
Transferability	Analyses the sampling and its accountability to be transferred widely. Needs high score also in the evaluation of sampling.	Some analysis of sampling and its accountability. Also score 3 or 4 points in the evaluation of sampling.	Minimal analysis of sampling and its accountability.	Analysis of sampling and its accountability missing or low score in sampling
Usefulness	Provides new points of view on the subject. Suggests further research. Suggest new policies or actions.	Provides two out three components described in 4 points score section of usefulness	Provides one out of three components described in 4 points score section of usefulness	All the components are missing

TOTAL	36			9

Table 3: Evaluation criteria table (Adapting Hawker et al. (2016) format of evaluation criteria.)

Nine categories and score board from one to four mean that the lowest evaluation score an article can get is 9 and the highest 36. The average score for the articles was 28. The score of each article is presented in Prisma chart table. All 25 articles were kept regardless of scores received. Removing articles based on quality analysis would have required an experienced researcher.

3.7 Data analysis and presentation

Data analysis includes a thorough interpretation of the findings that were conducted in data research phase. There is a need to be precise when describing the findings: when trying to synthesize different research methods´ similarities and disparities in a compact matter there is a chance of leaving important piece of data out. In a quality data analysis, a table of selected articles is presented. The evaluation criteria scores should be presented in the table. (Hawker et al. 2016.) To ensure quality of the research the selected articles are analysed with a Prisma checklist.

The presentation of the findings has to be done systematically. The ethicality and reliability of the research data must be assessed. There should be an author´s reflection of the findings. A summary of the background information and newly produced findings should be conducted in presentation section of the integrative literature. The author should also be able to present future obstacles and potential need of additional research in the future. (Kangasniemi et al. 2013.)

Integrative literature review is chosen as the research method for this study because of its comprehensive viewpoint. The reason for choosing the integrative literature review as a method for this thesis was the presumption that stunting, and its consequences, and how to prevent stunting are not well-known, and wider understanding is needed. The benefit of integrative literature review is that it can consist of data collected out of different research designs. Collecting data with different research designs can help the process of creating a comprehensive presentation about stunting as a global phenomenon. Data-analyses in integrative literature review can provide a holistic view on the problem.

The thesis will be proofread by an official English translator. All spelling mistakes are thesis' author's responsibility. All possible misunderstandings of original articles´ conclusions are author´s responsibility.

4 Results

25 articles met inclusion criteria and were selected. Ten articles focused on Iran, five on Palestine and rest focused on Yemen, Syrian refugees, Egypt, and Morocco. Nine out 25 articles were cross-sectional studies. Other forms research methods were two logistic regression models, randomized control trial, retrospective cohort study, systematic review, nested case-control study, one-stage cluster sampling, a quasi-experimental study, a comprehensive literature review, qualitative interview mixed with quantitative household survey analysis, case-control and Oaxaca decomposition model. One systematic literature review and comprehensive literature review were eligible because of their wide perspective. The comprehensive integrative literature review focused on maternal depression and its relation to stunting as a global phenomenon (Fawzi et al. 2019). The systematic review emphasized dietary habits of the Iranian children (Babashani et al 2021).

4.1 Barriers

There are three aspects that affect children's nutritional status: food security, the possibility to use adequate health facilities and feeding practises (Radi et al. 2013.) Most common barriers causing stunting were labelled under four categories: access to health care facilities deteriorated, socio-economic status, rural area as living environment and political by nature. The most common barriers are presented in table 3.

Barriers / Area	Socio-economic status	Political	Rural area	Access to health care
Yemen (Jordan & Egypt)			Mothers less educated, lack of sanitation and clean water and health care facilities	
Egypt, Jordan, State of Palestine, Lebanon, and Sudan	Healthy food costs are rising; nutritionally poor food is affordable	Healthy food costs are rising; nutritionally poor food is affordable		Policies unable breastfeeding and feeding habits counselling
137 low/ middle-income countries		Low education rate can cause 10 billion worldwide costs		Intimate partner violence counselling Maternal depression as greatest cause of stunting
Egypt	Low socio-economic status adds odd	Girls were more prevalent to be	Living in rural area adds probability of	

	on being stunted and anaemic	both stunted and anaemic	being stunted and anaemic	
Iran				Diminishing breastfeeding and starting complementary feeding can be the turning point for stunting
Syrian refugees living in exail in Jordan				Anemia prevalence high Stunting prevalence resembles host countries numbers
Iran				Cultural dietary habits affecting zinc intake: Zinc rich food counselling would be needed
Iran				Food programme counselling missing Big family size: intra-household food distribution
Morocco	Low economic status is linked to stunting prevalence			
Iran				Ethnicity might affect dietary choices
Yemen		The odds of a child to be stunted rice 47 percent when a mother has not attended secondary school.	In rural areas almost half are stunted compared to urban areas where only one fourth of children are stunted	
Iran	70 percent of the inequality of stunting prevalence in different socio-economic status was due to mothers´ educational level	Mothers´ education most relevant contributor to stunting		
Iran	Family income has an impact on			Length of breastfeeding affects stunting prevalence

	stunting prevalence yet still working mother seemed to increase stunting prevalence			
Palestine				Breastfeeding sub-optimal Early introduction to substitute food
Palestine	Political: siege caused shortages of food and disrupted food supply			
Palestine				Consanguity
Palestine				Micronutrient Supplementation Programme added to National Micronutrient Supplementation programme reduces stunting prevalence

Table 4: Barriers causing stunting.

4.1.1 Access to health care

Breast-feeding can be one of the cultural barriers causing stunting in Yemen. There are misbeliefs that the darker milk that breasts produce after giving birth would be dirty. Only 13 percent of Yemeni households have children that have been breastfed exclusively for the first six months. Water filled with sugar is the substitute that is commonly used, and it is not nutritionally rich as breastmilk. There is a clear need for breastfeeding promotion but in Yemen only 25 percent of the pregnant women had access to antenatal monitoring of the pregnancy and every fourth woman had a professional healthcare personnel assisting with the delivery. (De Souza 2017.) Breastfeeding counselling plays an important role in stunting prevention. Early introduction to nutritionally poor solid food substitutes reduces breastfeeding. (Shaker-Berbari, Tyler, Akik, Jamaluddine & Ghattas 2021.)

El Kishawi et al. (2013) research shows an increase in stunting prevalence in Gaza Strip. Breastfeeding percentage for the respondents was 97.7 and 24.4 for exclusive breastfeeding. Illiteracy rate of mothers was low, only 5.6 percent, 39.2 had secondary education and even 22.1 percent even had a university degree. Despite this, 95 percent of the mothers were unemployed. Less than 160 cm tall mothers have a tendency to have stunted children. El Ki-

shawi et al. (2013) also found correlation between stunting and consanguinity. Some 38.7 percent of the parents had married a blood-related family member (Kishawi et al. 2017). This background information of blood relation between parents was rare, none of the other selected research articles has reported the consanguinity percentage of the study population. The rise of stunting prevalence could be explained by the poverty rate, which was 61 percent in 2010 (El Kishawi 2017). Household food insecurity rate had increased up to 57 percent from 44 percent that it had been a few years earlier (El Kishawi 2017).

Veghari (2015) did a long-term research on how ethnicity affects malnutrition in Northern Iran. In Sistani, Turkman´s and Farsi-native ethnic groups had different stunting prevalence, hence they all had a low parental educational rate: 85.4 percent to 94.1 percent of parents had 1-12 years of schooling. From 48.5 percent to 55.3 percent of all ethnicities belonged to moderate economic status and Sistani had the most, 41.4 percent belonging to low economic status. Yet as an outcome stunting prevalence was 10.9 percent in Farsi-natives, 18.4 percent in Sistani and 16.3 percent in Turkmans. Interestingly, Farsi-natives and Sistani managed to reduce their stunting prevalence in 15 years 28.7 percent and 35.1 percent when the stunting prevalence of the Turkmans got 9.3 percent higher. (Veghari 2015.) As told, economic status nor the educational level does not explain the difference

Nutritional problem solving has not been targeted in Yemen´s National Health Strategy 2010-2025 nor in the Fourth Health Strategic Plan. In order to prevent stunting, there should be strong nutritional promotion done by health care professionals. Breastfeeding related misbeliefs could be solved by proper pregnancy monitoring programmes and access to health care professionals. Educating the pregnant person of the family is essential in the battle against stunting. Dirty water, lack of sanitation infrastructure, child marriages and early aged pregnancies and poor maternal nutrition are key factors that should be focused on when trying to resolve Yemen´s stunting high prevalence. (De Souza 2017.) There is a clear need for multisectoral programmes to tackle stunting prevalence.

4.1.2 Rural area

Yemen is a country that has a decades-long history of instability. After civil war in 1994, there were 16 years of instability that deepened the poverty of the Yemeni. Yemen is an example of a country that has simultaneously both civil conflict and conflict with another country, and in Yemen´s case, with Saudi-Arabia. The lack of food, water, fuel, and medical supplies led to dissatisfaction that escalated into a revolution in 2011. Four years later the civil war began which exacerbated the already weak food security system and sanitation infrastructure. In 2012 Yemen had already a stunting prevalence of 42.5 percent, and 12.6 percent severely stunted under 5-year-olds. This is the situation before the civil war began 2015. Yemen is statistically high also in child mortality rates: the prevalence of under-5-year-olds

dying is 60 percent, which is the highest in the whole of the Middle East and North Africa region. (De Souza 2017.)

Access to clean water and sanitation facilities can be a key factor affecting the health of Yemeni under-5-year-olds. When new-borns and infants are fed with water that is dirty, there is an increase in diarrheal diseases. Only 63 percent of Yemenis have access to clean drinking water and only 50 percent live in areas with proper sanitation infrastructure. These numbers are well below the average in the Middle East and North Africa Region. (De Souza 2017.) Water supply and sanitation infrastructure are worse in rural than in urban living environment. For example, in Yemen, stunting prevalence is 51.4 percent in rural setting and 33.7 in urban living environment. (Sharaf & Rashad 2016.)

4.1.3 Socio-economic barriers

Socio-economic status affects a child's nutritional outcome in many ways. Low educational level may lead to lower household income, not having enough income influences food choices. Income affects the possibility to access health care. (De Souza 2017.) Being a girl, living in rural environment and belonging to low socio-economic class are risk factor for both being stunted and anemic. (Shafie et al. 2020). Female education reduces the odds of the mother to have maternal depression and to suffer intimate partner violence in a relationship. Globally maternal depression, low female education and intimate partner violence are risk factors for stunting and have the greatest economic cost. (Fawzi et al. 2019.)

The literacy rate in Iran is 79.5 percent. In the Middle East and North Africa region Iran is known to have the lowest stunting prevalence, approximately 4.7 percent in the country. There is still wide variety even in Iran: in some rural parts out of under 6-year-olds the prevalence was from 10.3 percent to 22 percent. Differences can be explained with socio-economic status and especially mother´s educational level. Emamian et al. (2013) present a study where the prevalence of stunting was 1.67 times higher in the low socio-economic group than in the high socio-economic group. The key factor driving the change was the mother's educational level. (Emamiam et al. 2013.) Mothers ‘education and family income were also factors affecting stunting prevalence in Fatemi´s, Fararouei´s, Moravej´s and Dianatisab´s (2017) study in Iran. Interventions focusing on female education should be considered a priority. Education in all levels, such as literacy education and parenting education, can be relevant in stunting reduction (Dekkaki et al. 2013).

Double burden of malnutrition is present in Palestine. The prevalence of stunting and overweight in governmental and UNRWA (United Nations Relief and Works Agency for Palestine Refugees in the Near East) schools in West Bank was following 7 percent for stunting, 12 percent for overweight and 6 percent for obese. The mothers of respondents were mostly gradu-

ated from high school, 58.6 percent, but only 11.9 percent of the mothers worked. The children on average played sports twice a week and watched television for three hours per day. Households with access to enough food were more likely to be undernourished. Only 18.8 percent of Palestinian women are working, and unemployment of the mother adds the risk of underweight. There was no cause-and-effect relation between the mother´s educational level and undernutrition of the child. Boys were 2.8 times more likely to be underweight than girls. The older the female student the less she played sports and spent more time watching television. This and hormonal changes in puberty can explain why girls gained more weight than boys. The study also showed that obese and overweight children play less sports, but there is no clear evidence do overweight children avoid playing sports or children avoid playing sports and become overweight. (Massad et al. 2016.)

Economic growth could be seen as a key result to reduce stunting prevalence. In Egypt the result was opposite. When there was economic growth in the country, the stunting prevalence got worse. One of major reasons was avian influenza outbreak which led to destruction of poultry, the main source of protein. (Rashad & Sharaf 2020.)

4.1.4 Political barriers

Palestine could be called a territory of children. Some 47 percent of its inhabitants are children and of those 45 percent live in an area called West Bank and 51 percent in Gaza Strip. There are 4.75 million Palestinians and 42.7 percent of them are refugees. Two thirds of the refugees live in the Gaza Strip. (Massad et al. 2016.) In the Gaza Strip anaemia prevalence is varying from 17 percent to as high as 70 percent among children under 7-years of age. In the beginning of 2010, malnutrition among children was a growing trend in the region. (Radi, El-Sayed, Nofal and Abdeen 2013.) In 2002 stunting prevalence in Palestine was 17.5 percent. The regional prevalence varied: in 2006 the stunting prevalence in the West Bank was 8.5 percent and 15.3 percent in Gaza among children under 5-year-old. (El Kishawi, Soo, Abed and Muda, 2017.) The blockade caused by the government of Israel between the West Bank and Gaza 2009 caused political food insecurity to Palestinians in Gaza. (Radi et al. 2013.) The political and socioeconomic situations are barriers in stunting reduction in Palestine (Albeibeisi, Shariff, Mun, Abdul-Rahman & Abed 2018).

Radi et al. (2013) did research how the blockade affected 2-5-year-old children's nutritional status. The children participating to study were living in rural and urban areas and refugee camps. 95.8 percent of the children were breastfed. Breast milk as only food for the first six months was reality for 44.6 percent of the respondents. 51.2 percent had been given other forms of nutrition on the side of breastfeeding. Solely breastfeeding had increased from 2004 almost 20 percentage points: from 25.4 percent to 44.6 percent in the area. Family size was big; about half of the residents lived in a family with seven or more members and quarter of

the respondents in a family with nine or more members. A Sewerage system was available for all the households, and 78 had a waste bin. 99.9 percent of the families had access to water but only four percent used tap water for drinking purposes. Lack of electricity was a noted problem: candles, kerosine lamps were used to compensate for the electricity deficit. There was also a lack of gas to prepare food and that was compensated mostly with kerosine, electricity and wood. 92.1 percent of the households belonged to a low socioeconomic group. 92.1 percent of the families were classified as living below the poverty line. Almost all families had difficulties getting food. Reasons for shortage of food were high food pricing due to lack of food and reduced income. Rural areas were more insecure than urban areas, but refugee camps had the highest food secure percentage: only 68.6 percent of the inhabitants suffered from food insecurity. The most insecure food items were the sources of protein: poultry, meats, fish, and eggs. 42.3 percent of the respondents reported relying on aid and donations while 70.3 percent used credit or loaned money for purchasing food. (Radi et al. 2013.)

Stunting prevalence for all the respondents was 15 percent, and anaemia prevalence was 50.6 percent. Highest stunting and anaemia prevalence was in rural areas with 16.5 percent prevalence in stunting and 53.6 percent prevalence in anaemia. Lowest anaemia rate was in refugee camps when the lowest stunting rate was in urban areas. As could be expected, the stunting rate was higher in children that were living in families below the poverty line. Food insecurity also increased the risk of stunting. Low birth weight was also seen as a risk factor for stunting. (Radi et al. 2013.)

Another study in Gaza strip in Palestine was done with a sample population of same aged children, 2-5-year-olds, and data was collected three years later, in 2012, than Radi et al. did their study. Study had other similarities: the same age group children were presenting three different living areas: rural, urban and refugee camps. The prevalence of stunting was higher 19.6 percent compared to the 15 percent earlier. The prevalence was even worse in refugee camps: up to 22.6 percent. These rates are higher than the ones in 2002. (El Kishawi et al. 2017.)

Protracted crisis in Yemen has changed the course in nutritional programmes. In 2013 Yemen adopted the Cabinet Decree No 91 that states there is a need for the Minister of Public Health and Population to address national strategy for nutrition. The National Agriculture Strategy 2012-2016 was adopted including focus on nutritional components and food security. When these agreements were adopted, it meant other ministries to corporate and an increase in the budget funding nutrition. In 2012 Yemen participated in the Scaling Up Nutrition (SUN) movement and preparations for operational plans were started. Unfortunately, some of these programmes were overtaken by emergency programmes and some have been postponed due to ongoing conflict since 2015. (De Souza 2017.)

4.2 Successful interventions

4.2.1 Micronutrient supplement intervention for low anaemia prevalence

To fight anaemia, there has been the National Micronutrient Supplement programme in Palestine since the beginning of 21st century. In 2013 anaemia and vitamin A deficiency rates were high in the Gaza strip. Anaemia prevalence was as high as 59.7 percent in preschool aged children in Gaza and 73 percent suffered from vitamin A deficiency. Lack of nutrition rich food is a heavy barrier causing vitamin and iron deficiencies. Children are commonly fed with complementary foods such as cereals and plant-based food. These foods are also energy poor. Cheap and easy ways to tackle this problem have been micronutrient supplement and food nourishment interventions. Studies show that micronutrient powders are an effective and economical way to diminish anaemia prevalence. Smell-, colour- and taste-free powder is an easy addition for adults to learn how to use and for children to eat. (Albelbeisi, Shariff, Rahman & Abded 2020.)

Successful intervention in stunting prevalence and anaemia reduction was conducted when in addition to the Palestine´s National Micronutrition programme there was a micronutrient powder intervention. The intervention group of children were given three packets of powder in a week for a 12-month period. Children had refugee backgrounds and came from low-income families. The National Micronutrition package includes vitamin A and D and iron when micronutrient powder package included vitamins A, B1, B2, B6, B12, C, D, E, folic acid, niacin, iron, zinc, copper, selenium, and iodine. Measurements were done at the beginning of the intervention, at the end of the 12-month intervention period and three months after intervention. With a year-long intervention by the end of the period all the children were normal length and three months after the trial there was one moderately stunted. In a control group that only received the national micronutrient package there were 9 stunted children out of 100 at the end of the surveillance period and 11 stunted children three months later. There were 28 anaemic children out of 100 in the tested children at the end of the programme and 18 after three months of check-up. In the control group the same amounts were 48 and 43 children. (Albelbeisi et al. 2020.) Even though the stunting prevalence is low in Iran, there is need for micronutrient interventions (Pouraram et al. 2018).

4.2.2 Food vouchers

Iran is known for being the only country in the Middle East and North Africa region where stunting rates have been declining successfully. Iran has had a nutritional intervention programme for a decade to reach the most vulnerable that suffer from malnutrition: low-income families (Ghodsi et al. 2017). A food basket, that later was changed into an electronic card, is monthly provided for those families that participate in growth monitoring services in Primary

Health Care system and the low economic status can be confirmed. Nutritional experts decided age proper products for the food basket. The mothers of the households had compulsory lectures on nutrition and health in local health centres. The basket included groceries such as lentils, rice, vegetable oil, milk, soybean, chicken, tuna cans, spaghetti, and eggs. The food provided in the basket was not nutrient rich in vitamin A, zinc, or Calcium and the amount of energy was not sufficient for a month. (Ghodsi et al. 2017.) For example, zinc deficiency has a relation with retarded growth. When examining Iranian children aged 3-18 years zinc deficiency prevalence was 7.9 percent but 49.3 percent of these children were stunted. (Deghani, Katibeh, Haghighat, Moravej and Asadi 2011.)

As a background of Ghodsi et al. (2017) the illiteracy rate of the parents was low, from 9.2 percent for the fathers to 10.1 percent for the mothers. Some 94.7 percent of the children were breastfed, and 72.9 percent received vitamin A and D drops and 63.4 percent used iron supplements. (Ghodsi et al. 2017.) Between the six-month follow-up period Ghodsi et al. (2017) noticed that stunting prevalence did not change for 55 percent of children, got worse for 37.5 percent of the children, and got better for 7.5 percent of the children. Programmes to tackle malnutrition do not only aim to reduce stunting, but also other forms of malnutrition. The food aid receivers felt that the amount of food given was not sufficient to meet the needs of the growth of the child (Ghodsi et al. 2017). In many cases the food needed to be shared with all the household members, meaning it was not only provided to support one child´s feeding needs. Criticism was also distributed to the quality of the food, some receivers got junk food or rice that was inedible. (Ghodsi et al. 2017.)

Nutritional choices may not always affect negatively stunting prevalence. In a study conducted in Iranian first graders in Tehran the stunted and normal height children received same amount of energy and micro- and macronutrients in a day. The only notable difference was in dairy products and nuts consumption which was lower and higher consumption of fatty acids. Little criticism can be presented for the research. The participants were from same school and only 86 stunted children were selected. The dietary differences between children living in the same neighbourhood might not be statistically significant. The food consumption was measured by interviewing the mothers about previous days´ eating habits. (Esfarjani, Roustaee, Mohammadi-Nasrabadi & Emaillzadeh 2013.)

4.3 Refugees

Arab awakening in 2011 was a starting point for already a decade long conflict in Syria. The protracted crisis has led to the greatest global refugee crisis. Up to 6.7 million Syrians had fled by 2018. (Abou-Rizk et al. 2021.) Syria has a history of high prevalence of stunting. In 2001 the prevalence was as high as 31.1 percent decreasing into 27.5 percent in 2009. Ap-

proximately 2.4 million under 18-year-olds plus the same number of adults arriving to surrounding countries of Syria generated a prominent problem that the governments of host countries and humanitarian agencies were unable to meet the needs of the refugees. (Pernitez-Agan et al. 2019.)

Lebanon, located on the western border line of Syria, has hosted estimated 1.5 million Syrian refugees. Two thirds of those refugees, mostly women and children, live in the United Nations High Commission On refugees' camps. Instability of Syria has also caused volatility in Lebanon. Even living in UN hosted refugee camps the Syrian refugees' most households are suffering from lack of shelter and sufficient amount of food. (About-Rizk et al. 2021.) In their study Abou-Rizk et al. (2021.) noticed that out of Syrian refugees that were registered UNCHR camps, only 8.9 percent received food assistance such as e-vouchers from the World Food Programme (WFP). Every fifth of the refugee mothers was anaemic and every third child was anaemic too. These prevalences are lower than on average globally. (Abou-Rizk et al. 2021.)

The Syrian refugee mothers that participated in the research were almost all housewives: 97.2 percent. The illiteracy rate was 16.3 percent and more than half (58.6 percent) had primary education. Family, friends, and media were references of health and nutrition messages for 63.2 percent of the mothers. 30.1 percent of the mothers used micronutrient supplements, mainly Iron and Iron-folic acid (65.9 percent). The ones receiving health related information from media and friends were less likely to be anaemic. Overall, the intake of nutrients was inadequate. 62.1 percent of the mothers visited health care facilities more than four times during pregnancy. Some 26.9 percent of the mother were overweight and 34.6 percent obese. Stunting prevalence was 9.0 percent meaning double burden of malnutrition appeared in households where mothers were overweight or obese and children stunted. (Abou-Rizk et al. 2021.)

There are multiple reasons why double burden of malnutrition occurs among Syrian refugee mothers. Individually the mothers suffered from anaemia and at the same time were overweight. This might be because of food insecurity and lack of knowledge of possible nutrition services that non-governmental organizations offer. When nutritious healthy food is not available junk food is more consumed. It is possible that refugees start to adapt to the host countries´ food culture and the eating habits are not healthy. For example, in Lebanon the studies show that women consume quite a lot of sweets and the total diet includes a lot of fat. (Abou-Rizk et al. 2021.)

Similar mild stunting prevalence was distinguished in two other studies of Syrian refugees in neighbouring countries and other Eastern Mediterranean countries. Screening health status of 14552 displaced Syrian children living in Egypt, Jordan, Iraq, Turkey, Lebanon, and Greece

showed quite mild stunting prevalence 9.1 percent and 10.6 percent prevalence for overweight and obesity (Pernitez-Agan et al. 2019). Hossain, Leidman, Kingori, Harun & Bilukha (2016) found similarly low prevalence of malnutrition among Syrian refugees in host countries even though simultaneously the anemia prevalence was high.

The low prevalence of stunting in Syrian refugees could be explained with integration to hosting communities. Only less than one percent of the respondents were living in refugee camps. Lebanon, Greece, and Egypt do not even have official refugee camps. Most of the refugees need to adjust to the surrounding environment. Another possibility is that refugee assistance programmes are effective and have been improving the undernutrition status of children. Quite high overweight prevalence tells on high energy food intake. Most commonly used food articles were cereals, oils and fats, pasta, and sweetened food. Protein consumption was low. (Pernitez-Agan et al. 2019.)

5 Discussion

5.1 Ethics and bias

All research articles that were selected used either national health surveys conducted by World Health Organization or the researchers had requested permission of the parents of the participants. Two separate researchers doing the data search would add quality to systematic review, which is now missing from this thesis. When one person conducts a wide data search, like this thesis, there is a chance for bias. In this thesis 6334 articles headlines were read and that leaves a possibility that meaningful articles could have been missed. English as an inclusion criteria can also add distortion to results. The Middle East and North Africa is a region where Arabic with its multiple dialects is the official spoken and written language. Many Arabic speaking countries also have French as their second official language. There might be regional research that is conducted in French, Arabic, or other language than English which are all excluded from this thesis.

An integrative literature review research method enables to form a holistic view of the research problem. This thesis combines research articles with various research methods. This can lead to comprehensive and wide understanding of stunting as a global problem. It also adds a chance of bias in the making of conclusions. Multiple research designs can affect deduction process. In this thesis many research articles collected different background information of respondents. The differences in background information create variation in results. In this thesis it was notable that breastfeeding and anemia prevalence were the most commonly collected background information whereas consanguity of the parents was only collected in one.

Research related stunting should also have certain rules. Most studies did measure the length of a child but there was no background information if the child had been born normal length. Stunted children are born as normal height, but the growth starts faltering after six months. Short stature can be result of something else than stunting and that should be determined in the research. Stunting is a global problem, affecting 149.2 million children worldwide, and guidelines of conducting a quality research of stunting as a phenomenon should be created.

5.2 Stunting reduction

Stunting reduction needs multi-sectoral co-operation. Reduction in stunting prevalence can be achieved by nutrition-sensitive approaches. Prolonged conflicts, regardless of being political or armed conflict, set barriers to individual´s dietary habits. Rural living areas are at high risk of denial of access to basic needs in conflict setting. Higher stunting prevalence and lower mothers' educational rates were more common with people living in rural area. Conflicts cause unpredictability. Previous research highlight the vulnerability of rural areas. In conflict setting rural areas are more exposable to lose their programmes that intend to help (Singh et al. 2021). Costs of delivering help in the rural area are higher. Access to rural areas get more difficult during conflicts and harm the delivering process. (Sing et al. 2021.)

Nutrition-sensitive interventions are well funded (Ickes, Trichler & Parks 2015). In 2010 approximately 1790 million US dollars was allocated to nutrition-sensitive programmes such as Reproductive Health Care, Food Aid/Food Security and Emergency Food Aid. 379.4 million US dollars was allocated to nutrition-specific interventions. (Ickes, Trichler & Parks 2015.) That is almost four times more money allocated to nutrition-sensitive programmes. It is good to bear in mind that many nutrition-sensitive interventions, such as breastfeeding promotion, and food fortification programmes are quite low in economic expenses compared to water supply system building in rural areas.

This thesis highlights the variety of barriers there are related success of stunting reduction. Armed conflicts cause stress, anxiety to both children and their parents. Violent conflicts reduce access to health care and increase problems in food and other forms of aid to the people in vulnerable position. Food insecurity and problems with access to clean water and adequate sanitation are not choices an individual can have an impact on. Even though nutrition-specific emergency interventions have improved for the past few decades, the aim of those programmes is to reduce mortality and acute malnutrition, such as wasting (Bhutta et al. 2013).

Fragile and conflict-affected countries are not always part of armed war. There can be economic sanctions from foreign states that affect on individual level. Due to political actions the prices of the food rise. High economic costs of food add the risk of poor dietary choices since fat and sugar rich processed food is often less expensive than healthy nutritional food

such as vegetables. In many cases energy dense high processed food are consumed and another form of malnutrition emerges. Overweight and obesity have been a growing trend globally. The double burden of malnutrition is a great problem. There is a need for analysing the effectiveness of overweight prevention programmes (Bhutta et al. 2013).

Life-long dietary counselling is important. Lack of basic education of mothers pursues them to seek knowledge from elderly people. Nutrition counselling by health care workers is essential in the reduction of harmful misbeliefs that lead to malnutrition or even deaths of children. Community-based interventions by health care workers have been useful. The beginning of breastfeeding within one hour after labour doubled when community-based intervention was taken into action (Bhutta et al. 2013).

Focusing on multi-sectoral co-operation and educating people who work in fragile or conflict affected states are essential factor in the prolonged fight against malnutrition. Good meaning interventions are not beneficial if the understanding of the larger picture is missing. For example, the World Food Programme had a long intervention project of infant formula since 1996 in Iraq (Diwakar, Malcolm & Naufal 2019). Teaching formula feeding and the use of formula was insignificant. The formula was diluted with water that was not clean. The use of formula reduced breast-feeding and dirty water caused even infants' deaths among malnutrition. The formula programme intervention ended 2017 due to political will of raising breast-feeding prevalence. (Diwakar, Malcolm & Naufal 2019.)

Community-based counselling is one the key solutions this thesis emphasizes. Most of the barriers affecting stunting prevalence reduction could be solved with proper counselling. Barriers in nutrition, psycho-social wellbeing and hygiene are tight together. Enhancing basic health care should be in top priorities in the future.

5.3 Future obstacles

Climate change is an actual threat to global nutrition. It will increase the risk of malnutrition, especially stunting. The greenhouse effect and global warming will decrease the total amount of rainfall and at the same time increase temperature. There will be a decline in crops which leads to greater food insecurity. (Cooper et al. 2019.) Droughts, floods, and hot waves will be a great concern in the future. Lack of water will affect sanitation (Galal, Corroon and Tirado 2010) which can increase for example diarrhoea outbursts. Smith & Myers (2018) predict a worsening future in the Middle Eastern food security and micronutrient sufficiency. The ever-growing CO2 emissions can reduce zinc, iron, and protein occurrence from three up to 17 percent from today´s amounts in 30 upcoming years. Globally in the worst-case scenario this would mean 175 million in acute need of zinc and 122 million in need of protein supplements. (Smith & Myers 2018.)

Eastern Mediterranean region had had a slow decrease in stunting prevalence in the first twenty years of the 21st century and the reduction rate was far behind to meet the Sustainable Development Goals by 2025. The COVID-19-pandemic that started in 2019 added a menacing vision on the future of malnutrition. The global pandemic affects the world´s economy and may cause an increase in food pricing. (Jawaldeh et al. 2020.) This might lead to a vicious circle where families cannot buy nutritious food due to higher prices and junk food is only an affordable piece of meal. It was predicted in the beginning pf the pandemic that only in 2020 due to COVID-19 and the limits on healthcare and food security that it sets, from 2000 to 12000 under-5-year-olds could die in a half of a year (Jawaldeh et al. 2020). As seen in Yemen, due to emergency, the nutrition focused programmes might be postponed and new emergency programmes without nutritional focus implemented. Since COVID-19-pandemic has not been defeated when writing this master´s thesis the far-ranging outcomes on stunting and malnutrition can only be imagined.

6 Conclusion

This thesis aimed to answer research questions related to stunting and its reduction in conflict affected countries.

1) What kind of barriers there have been in stunting prevention in the Middle East and North Africa region?
2) How do peace and conflict or fragility of the state affect stunting prevalence?

Iran is known for being the only country in the Middle East and North Africa region where stunting rates have been declining successfully. Iran´s nutritional intervention programmes are targeting the low-income families that are in the most vulnerable position. Successful programmes included both food aid and counselling and nutritional education in local health care centres. Successful intervention included multi-sectoral co-operation. Both nutrition-sensitive and nutrition-specific intervention methods were utilized to reach goals. In Palestine it was noted that additional micronutrient intervention combined with national micronutrient programme reduced stunting prevalence.

During this thesis process it became evident that stunting and robust interventions to decline it are missing. Effectiveness of current or past interventions have not been deeply researched. There were analyses of effectiveness of six months long intervention period. Stunting is malnutrition status which occurs only when a person is malnourished for long period. Interventions should be planned for a longer time period to receive results.

In this thesis multiple barriers delaying stunting prevention were identified. The barriers were categorized in four categories. Inadequate access to health care facilities, living in rural environment, political decisions and socio-economic status. Low prevalence in exclusive breastfeeding, harmful misbeliefs regarded to breastfeeding, maternal mental health problems and cultural choices in dietary habits were calculated in barriers in inadequate access to health sector.

Living in rural areas adds barriers in multiple ways. Rural areas are battling in water supply and sanitation systems. In emergency situations the costs of delivering aid to rural areas are higher and that is why often then left out of the aid. In some intervention situations the actual aid, such as food voucher, has been useless since grocery store where it is supposed to be used is located so far away from the person receiving aid.

Political barriers are barriers caused by political decisions. Such decisions are siege or sanctions. These often lead food insecurity for example by denying the food distribution of humanitarian organizations. It can be also seen as increase of the prices of necessities, such as food and gasoline. Socio-economic status includes female education and occupation. Less educated mothers have less purchasing power. There is no clear data if mothers employment rate reduces stunting prevalence.

Almost all the barriers could be resolved by empowering access to basic health care. Enabling basic health care needs political decision power. Barriers could be defeated with counselling and education. Most uneducated women received their information about breastfeeding and complementary feeding from elderly females. Antenatal counselling and family planning counselling could be resolutions to detect early signs of intimate partner violence, maternal depression, and anxiety. Micronutrient deficiencies could be detected and counselling on nutritionally rich food could be offered.

Prolonged conflicts and destruction of basic health care are huge obstacles. The problem with emergency programmes is, that they are not planned to last decades, like the modern conflicts tend to last. The new intervention model should be more focused on re-establishing basic health care such as health centres.

Not all conflicts are armed conflicts. Political unstability is seen in fragile countries. Political shifting in food prices push the people to make poor dietary choices. Availability and low price of processed junk food are the reasons why overweight is a globally rising problem. Unstable environment and low socio-economic status force to purchase food that is high in energy but nutritionally poor. It was notable that refugees fleeing to neighbouring countries adapted the stunting prevalence of the host country. Most of the refugees did not receive food aid nor lived in official UNHCR refugee camps.

According to Hagfors (2020) nurse delegates going on a mission in crisis areas confront a lot of victims that are children. One of the key messages of Hagfors´ thesis was that the delegates wished to have had more training and knowledge about the nutritional problems these children they treated had. (Hagfors 2020). Hagfors´results laid the groundwork for the importance of this thesis´ topic of stunting prevention in conflict setting. This thesis aims to emphasize the need for education of stunting among health care personnel and among people working in conflict affected areas. This thesis underlines the need for more research on effectiveness of interventions of malnutrition. The is clear need to estimate the emergency programmes during conflict. The phase of conflict has changed, the prolonged conflicts of the Middle East and North Africa region predict that long-term investments in basic health care and reconstruction of basic health care are necessary.

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Attachments

Attachement 1: Research table.

Author, year of publication, title and quality score	Abstract	Introduction	Methods	Results	Discussion	Other information
De Souza, L. R. 2017 Correlates of child undernutrition in Yemen Quality score: 22	Main correlates of Stunting in Yemen	Analyses 6397 Yemeni households´ and 5783 children aged 6-59 months to underestimate malnutrition rates	Logistic regression to data gathered from National Social Protection Monitoring Survey	Mothers education plays a key role: secondary educated mother means 47 percent less chance of being stunted	44,32 percent of children whose mother has not attended secondary school were stunted when only 24,5 percent of the mothers who attended secondary school. 45,92 percent of rural households´children were stunted and 28,26 percent in urban area.	
Sharaf, F.M. & Rashad, A.S. Regional inequalities in child malnutrition in Egypt, Jordan and Yemen: a Blinder-Oaxaca decomposition analysis Quality score: 36	Rural-Urban inequality	Aims to analyze the malnutrition differences between urban and rural areas in Yemen, Egypt & Jordan	Oaxaca decomposition model to understand the reasons between two differentials: rural and urban habitat. Demographic Health Surveys 2012-2014 as source of information for stunting prevalence	In urban setting stunting prevalence is better but only in Yemen significantly: in Yemen the prevalence in urban area is 33,7 % when in rural area 51,4 %, in Jordan the same numbers are 7,4 and 8,9 % and in Egypt 23 % and 20,7 %. It is notable that in Egypt the urban children are more stunted.	Rural households: less educated, lack of sanitation and clean water and health care facilities	

Esfarjani et al. 2013 Major Dietary Patterns in Relation to Stunting among Children in Tehran, Iran Quality score: 22	The relationship between dietary patterns and stunting	Determines the relationship between major dietary patterns and stunting in the first grade pupils in Iran	Case-control study, 86 stunted vs 308 control group children first graders in Tehran. Dietary data were collected using two 24-hour dietary recalls through face-to-face interview with mothers. Factor analysis was used for identifying major dietary patterns.	Mean consumption of dairy products, dried fruits and nuts were significantly lower among stunted children. Three major dietary patterns were identified: 'traditional dietary pattern', 'mixed dietary pattern' and 'carbohydrate-protein pattern'. No significant relationships were found between traditional and mixed dietary patterns and stunting. Adherence to dietary patterns high in protein and carbohydrates might be associated with reduced odds of being stunted among children	Stunted children had significantly lower intake of 'dairy products' and 'nuts and dried fruits' and slightly higher intake of 'fats'.	Quite small participant group for data collection: should the children have been from different areas? The food patterns did not vary that much
Shaker-Berbari et al. 2021. Predictors of complementary feeding practices among children aged 6-23 months in five countries in the Middle East and North Africa region. Quality score: 28	Diets of children aged 6-23 months	Analyses factors affecting dietary patterns of children aged 6-23 months in five Middle Eastern and North African countries: Egypt, Jordan, Lebanon, State of Palestine and Sudan	An exploratory approach: key informant interviews and household data surveys. Qualitative interviews and quantitative household survey analysis.	Complementary feeding practices do not meet the needs	Maternal education and economic inequality Policies are not supporting the possibility of adequate counselling of mothers Grandmothers play a key role in information sharing	Some household surveys were from 2014, Egypt, Sudan And Palestine, Lebanon from 2016 and Jordan 2017/2018 Children feeding practices were first time analysed in many countries, no trending image possible

Fawzi et al. 2019. Lifetime economic impact of the burden of childhood stunting attributable to maternal psychosocial risk factors in 137 countries low/middle-income countries. Quality score: 28	Psycho-sociaal risk factors	Addresses the psycho-social risk factors affecting stunting in low- and middle income countries. Also evaluates the lifetime costs of these risk factors.	104 country´s stunting prevalence was adopted from WHO database, 33 countries were population-weighted on sub-regional averages. A comprehensive literacy review was done	Maternal depression resulted in most stunted cases, along with low maternal education and intimate partner violence.	Economic costs of depression was 14,5 billion, maternal education 10 billion and intimate partner violence 8,5 million.	
Pernitez-Agan et al. 2019. Nutritional profile of Syrian refugee children before resettlement. Quality score: 28	Under- and overnutrition in Syrian refugee children	Analyses 14552 Syrian refugee children´s (aged 6 to 59 months) nutritional status. Children were living as refugees in Jordan, Lebanon, Greece, Turkey, Egypt and Iraq.	Data was collected from the International Organization for Migration. Stata was used for processing estimates.	Low stunting prevalence from 7-14.8 percent. Overweight prevalence was approximately 10,6 percent.	The stunting prevalence resembled the prevalence of the host country	The Syrian Arab Republic had stunting prevalence of 27,8 percent in 2010, refugees living in neighbouring countries have quite lower stunting prevalence.
El-Shafie et al. 2020. Prevalence of short stature and malnutrition among Egyptian primary school children and their coexistence with Anemia. Quality score: 28	Anaemia occurrence with forms of malnutrition.	Analyses 33150 Egyptian children aged 6-11 years and the prevalence of malnutrition and its concurrence with anaemia. Aims to determine the etiology of short stature.	A cross-sectional study	Underweight prevalence 8,2percent, while overweight prevalence 21,8 percent. 17 percent were short of stature out of which 40,8 percent for familiar reasons and 24,2 percent constitutional. Anaemia prevalence was 26 percent and both stunted and anaemic were 9,9 percent of the children	Girls, rural area residents, and low socio-economic status were more prevalent to be stunted and anaemic.	

Fatemi et al. 2020. Growth retardation among children in southern Iran: a 7-year population based cohort study. Quality score: 24	The age when stunting can be detected.	400 Iranian children aged from birth to 7 years. Aims to detect the age when stunting starts to occur in both genders.	population-based retrospective cohort study	18 percent of the children were stunted. Boys started to falter in their growth at the age of 6 months and girls at the age of 9 months.	Complementary feeding starts around 6 months old infants and could be the factor causing the growth faltering.	
Rashad & Sharal 2016. Economic growth and Child Malnutrition in Egypt: New Evidence from National Demographic and Health Survey Quality score: 28	Economic growth and malnutrition	Egyptian National and Health survey results between 1992-2008 compared to economic growth and forms of malnutrition. Total 45600 household surveys were collected.	A logistic regression model	During the 16 follow-up stunting prevalence got higher from 25 to 28,9 percent. The research did not find significant association between economic growth and stunting reduction.	Avian influenza outbreak led to destruction of poultry, the main source of protein.	
Abou-Rizk et al. 2021. Anemia and Nutritional Status of Syrian Refugee Mothers and Their Children under Five Years in Greater Beirut, Lebanon. Quality score: 28	Anemia and Syrian refugees	Analyse anemia prevalence and nutritional status of 433 Syrian refugee mothers and under 5-year-olds living in Beirut, Lebanon.	A cross-sectional survey	anemia prevalence was 21,7 percent for mothers and 30,5 for children. Stunting prevalence 9,0 percent approximately	Coexistence of overweight anemic mothers and undernourished children living in same household.	Hardly any of the respondents received World Food Programme food vouchers.

Hossain et al. 2016. Nutritional situation among Syrian Refugees hosted in Iraq, Jordan and Lebanon: cross sectional surveys. Quality score: 28	Nutritional status Syrian refugees	2005 households, 3375 children and 299 women of Syrian refugees living in Iraq, Jordan and Lebanon were analysed for anemia prevalence and nutritional status	Cross-sectional survey	Stunting rates were similar to host countries. Acute malnutrition rates were low in all countries. Anemia prevalnece was high.	Even though anemia prevalence was high stunting prevalence was similar to host countries.	
Deghani et al. 2010. Prevalence of Zinc Deficiency in 3-18 Years Old Children in Shiraz-Iran Quality score: 20	Zinc deficiency	Analyses zinc deficiency rates of 902 children aged 3-18 years living in Shiraz	Cross-sectional study	The prevalence of zinc deficiency was 7,9 percent. Mild stunting was more prevalent in zinc deficient children.	There should be implementation of enhancing zinc intake with food choices rather than as supplements.	
Ghodsi et al. 2018. Effectiveness of the national food supplementary program on children growth and nutritional status in Iran. Quality score: 32	Effectiveness of national food distribution programme	Aims to evaluate 362 Iranian children aged 6-72 months who are participating national food distribution programme and their malnutrition status	A quasi-experimental design	Economic status of the families were low, intrahousehold food sharing, irregular availability, quality of the available food, and insufficient counselling were barriers affecting programme outcome	Empowerment strategies are insufficient	

Dekkaki et al. 2013. Growth evaluation of a group of children enrolled in public schools in Rabat, Morocco: the role of socioeconomic factors. 32 scores.	Socioeconomic status and its relation to malnutrition	Analyses 1569 Moroccoan children aged 7-14 years malnutrition status and its correlation with socioeconomic status.	A cross-sectional study	Stunting prevalence 18,2 percent. Families´socioeconomic status was low. Unemployment rate of the mothers was 85 percent and 59 percent of the fathers were labourers.	Malnutrition is linked to low socioeconomic status. Income, schooling and food quality also affect growth.	
Veghari & Vakili 2016. Trend of Stunting, Overweight and obesity among children Under Five Years in a Rural Area in Northern Iran, 1998-2013: Results of three Cross-Sectional Studies 30 scores.	Malnutrition status of Iranian children	Analyses in total 7575 Iranian children under five years of age in 1998, 2004 and 2013 and the prevalence malnutrition	3 Cross-Sectional studies	Short stature was a major reason for being overweight in 1998, it was extra body mass in 2013. Stunting prevalence had dropped from 33 percent to 15 percent approximately between 1998 and 2013.	Many background factors were not measured: such as food intake, physical activity, ethnicity and sociodemographic factors.	
Veghari 2015. The Comparison of Under-Five_children´s Nutrition Status Among Ethnic Groups in NOrth of Iran 1998-2013; Results of a Three Stages Cross-Sectional Study 28 scores	The relationship between ethnicity and stunting	Analyses in total 7575 Iranian children under five years of age in 1998, 2004 and 2013 and the prevalence malnutrition and its dependency on ethnicity	3 cross-sectional studies	There was a difference in stunting prevalence in fifteen year time period between different ethnicities.	This study only focused on analysing the relationship between ethnicity and malnutrition.	

Emamian et al. 2013. Mother's education is the most important factor in socio-economic inequality of child stunting in Iran 32 scores.	Socio-economic inequality and stunting	Analyses 1395 Iranian children under 6-years of age growth status and compares the status with socio-economic status	A cross-sectional, population based survey, Oaxaca-Blinder decomposition method	Mothers´educational level had significance on stunting prevalence. 70 percent of the inequality of stunting prevalence in different socio-economic status was due to mothers´educational level		
Massad et al. 2016. Double Burden of Undernutrition and Obesity in Palestinian Schoolchildren: A cross-sectional study. 24 scores	Double burden of malnutrition	Analyses 1484 Palestinian children aged 5 to 16 years malnutrition status	A cross-sectional study	In the West Bank prevalence of stunting was 7 percent.		
Pouraram et al. 2018. Second National Integrated Micronutrient Survey in Iran: Study Design and preliminary findings. 28 scores.	Four micronutrient status: iron, zinc, and vitamins A & D.	Analyses 30800 Iranian individuals from groups: 15-23 months old children, 6-year-old children, pregnant women with over fifth months of gestation, adolescents females from 14-20 years of age, adolescents males from 15-20 years of age and 50-60 year-old females and 45-60-year-old	One-stage cluster sampling	Anemia prevalence was highest among 15-23-month-olds: 17,1 percent. Vitamin D and Zinc deficiency were highest with pregnant women: 85,3 percent for Vitamin d and 8 percent for zinc. The prevalence of overweight was highest among adults. Stunting prevalence was low: 8 percent for babies aged 15-23 months and 4,9 percent for 6-year-olds.		

		males and their micronutrient status.				
Fatemi et al. 2018. Stunting and its associated factors among 6-7-year-old children in southern Iran: a nested case-control study. 20 scores	Factors causing stunting	Analyses 400 6-7-year-olds Iranian children stunting prevalence and factors enabling stunting	Nested case-control study	Mother's occupation, family income, duration of breastfeeding , consumption of animal based proteins and dairy products	Mothers at work spend less time with children	
Babashani et al. 2021. Systematic review and meta-analysis of the most common processed foods consumed by Iranian children. 32 scores	Processed food consumption	Analyses ten studies with 67093 children food consumption habits	Systematic review	Sugars and sweets were most consumpted following oils, biscuits and cakes.	Diest are nutritionally poor	
Albeibeisi et al. 2018. Growth patterns of Paetsinian children from birth to 24 months. 32 scores	Growth patterns of Palestinian children	Analyses growth patterns of 2632 Palestinian children aged 0-2 years.	Retrospective cohort study	At 6 months the prevalence for stunting was 9 percent but at the age of 24 months the prevalence was 20 percent.	Political and socioeconomic factors are causing growth faltering	

Radi et al. 2011. Ongoing deterioration of the nutritional status of Palestinian pre-school children in Gaza under the Israeli siege 26 scores.	Nutritional status of 2-5-year-olds Palestinian children	Aims to analyse the nutritional status of Palestinian pre-school chilren living under blockade	A cross-sectional household survey	Stunting prevalence of 15 percent. Main cause of food insecurity was political siege that caused shortage of food.	Anemia prevalence was 50 percent	
El Kishawi et al. 2017. Prevalence and associated factors influencing stunting in children aged 2-5 years in the Gaza Strip-Palestine: a cross-sectional study. 24 scores.	Stunting prevalence in Palestinian preschoolers	Aims to analyse 357 Palestinian children aged 2-5 years and their mothers stunting prevalence and factors causing stunting.	A cross-sectional	Stunting prevalence 19,6 percent. Shorter mothers were more likely to have stunted children. Parents who were married to blood relatives had higher odds of stunted children	Consanguity was only mentioned as background information in this research	
Albeibeisi et al. 2020. Multiple micronutrient supplementation improves growth and reduces the risk of anemia among infants in Gaza Strip, Palestine: a prospective randomized community trial 26 scores.	Micronutrient powder supplement	Aims to analyse 200 Palestinian children nutritional status after receiving Micronutrient powder supplement additionally to National Micronutrient Supplement.	A randomized community trial	Stunting prevalence was lower in the experimental group and additional supplementation programme improved nutritional status of children.		