Application of the Life Course Model and First 1,000 Days of Infancy to Assess Refugee Health Trajectories in Zaatari Refugee Camp

By

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Abstract

As long as the act of war continues to persist in this world, the refugee crisis will remain a major public health topic. According to the United Nations Refugee Agency, the United Nations High Commission on Refugees (UNHCR), there are an estimated 21.3 million individuals who have been forced out of their homes and are now considered refugees. More than half of the 21.3 million refugees originate from four countries/territories located in the Middle East or Greater Middle East region and North Africa (1). The Middle East and North African region, hosts 39% of the total global refugees, causing increased demands on these scarce-resourced regions. Many of these refugees find themselves unable to be taken in by a new country so instead find themselves in a refugee camp.

These camps are truly a public health issue and demonstrate the clear effects of the social determinants of health and how the life course model of health and life plays itself out in a negative way, where early in life resource insufficiency leads to later life health deficiency. One of the areas which has experienced the greatest effects of war in refugee camps has been the Middle East.
**War and Public Health**

One of the most damaging and persistent public health issues has always been conflict and wars among people and nations. While we have not had the “great wars” like we had in the 1900s, we have more than made up the destruction of property and deaths to armed fighters as well as bystanders with multiple, localized new or re-kindled conflicts and/or wars. These battles have greatly affected the health of individuals, families and regions and have brought up the serious prospect of nuclear annihilation. Clearly the destruction as well as the stress and mental pressure this has caused the world is a significant factor in the reduction of quality and quantity of life on this Earth. One of the seemingly necessary, yet intractable fallout from war has been the displacement of non-combatants and the mushrooming up of refugee cities, a.k.a. “camps” where many persons now have been born, have lived their whole life thus far and now face the prospect of living out the remainder of their lives in these non-health inducing environments. These camps are truly a public health issue and demonstrate the clear effects of the social determinants of health and how the life course model of health and life plays itself out in a negative way, where early in life resource insufficiency leads to later life health deficiency. One of the areas which has experienced the greatest effects of war in refugee camps has been the Middle East.

**Middle East Refugee Camps**
According to the United Nations Refugee Agency (UNHCR), there are an estimated 21.3 million individuals who have been forced out of their homes and are now considered refugees. More than half of the 21.3 million refugees, originate from four countries/territories located in the Middle East or Greater Middle East region and North Africa: Palestine with 5.2 million, Syria with 4.9 million; Afghanistan with 2.7 million, and Somalia at 1.1 million, respectively (1). (Refer to figure 1 for a visual breakdown of the percentage of refugees and their originating/home countries).

But where are all the refugees going? Well the Middle East and North Africa host 39% of the total global refugees, and Africa hosts 29%, The Asia and Pacific region host 14%, the Americas host 12%, and Europe 6%, (1). (Refer to Figure 2 for a visual breakdown of the percentage of refugee hosting regions).
Due to the refugee crisis, refugee camps scattered within the Middle East and North Africa are filled to the brim with individuals seeking safe refuge from conflict and wars. Since World War II, the Syrian Refugee crisis has been the largest international refugee crisis, leaving an estimated 4.9 million Syrians in search of a safe haven (2). The large number of refugees not being accepted elsewhere has led to the creation of multiple Syrian refugee camps all over the world, the largest being Zaatari with an estimated 85,000 inhabitants (2).

**Zaatari Refugee Camp**

The Zaatari camp first opened its door in July 2012. The camp is situated in northern Jordan, just 7 miles south of the war-torn country of Syria. The camp is a three-square-mile piece of land located in a desolate desert; the closest city is Mafraq, 10 km east (3). The camp extends 2.5 miles by 1.5 miles and is broken down into 12 districts (3). Within the property are included 30,000 shelters, 3 hospitals, and 3 schools (3). There are no active household water and sewage
systems and the electric grid is considered over the limit (3). Transportation to and from critical facility units within the camp, such as hospitals, are mainly accomplished on foot. Vehicle transportation is limited due to the lack of resources (4). Refugees are restricted from leaving the camp site without proper documentation permitted to them by the Jordanian government (5).

Approximately 50,000, or more than 55%, of these inhabitants are from age 0 to 18, another 40% are from age 19-49 and the remaining approximately 5% is elderly, over age 50.

The disproportionate share of young people and both high crude birth rate of the Zaatari Camp almost guarantee that it’s population will remain very high as its crude birth rate is nearly double that of pre-war Syria and neighboring non-war countries—making the already turbulent living situation in Zaatari even more strenuous (2).

Given this extremely high level of childbearing, it is important from a public health perspective to ask what are the particular challenges of a refugee camp with a high birth rate. And furthermore, what are the particular difficulties that go with trying to survive in a refugee camp when you are either a pregnant woman or newborn child? More importantly, how will the health of new and future generations be affected—not only in the stages of early life, but on the continuous spectrum of health?

Maternal and Child Health researchers and professionals have often identified the “first 1000 days” is that critical perinatal period in which the mother gestates, delivers, breast-feeds, protects and nourishes, and begins the critical growth and learning phases of a new human being. This paper will use a life course model approach in investigating the important perinatal phase of life course of children born in the Zaatari Camp and their mothers. It is proposed that this perinatal stage might be the first age group for whom we might pilot attempting to improve both
the environment as well as health-inducing services, and if successful, then progress to the next older cohort of camp residents.

A review of risk factors such as prematurity, environmental exposure, and specific disease threats as well as positive protective factors that the perinatal human must successfully encounter as well as positive interventions in a pilot intervention will be shared.

Life Course Model

This paper will evaluate life in Zaatari Camp by applying the principles described in the public health’s Life Course Model (LCM). With such an astonishingly high crude birth rate in a place of great instability, the public health life course provides insight into the projected health status of the future generations born in the refugee camp. The life course model (LCM) is a modern approach to evaluating long-term racial and ethnic disparities which started from disparities in birth outcomes, and is predicated upon the developmental importance of the occurrence of early programming in children and the life-long cumulative health outcomes which are understood and integrated by biological, social and environmental pathways (6). The key concepts of the life course model are:

- Timeline: The present experience aids in the prediction of future health status;
- Specific Timing: Some periods, such as perinatal and peripubertal are more sensitive than others
- Environmental factors: such factors are very important to development such as the physical, and social aspect and the direct and indirect impact on health status (6).
Utilizing the above concepts a LCM analysis begins during preconception and continues until end of life. It is an evaluation methodology that provides vivid insight into the trajectory of the health outcomes of individuals being born and raised in the Zaatari camp.

Multiple risk factors, especially during critical periods of human development, pose a great risk for future health and well-being. Although some factors may not be considered a current acute risk, individual, and time-separated risk factors can join together to form chronic conditions that develop in adult and later phases of life (4).

It is evident that the experiences that occur in early life will have a great impact on the quality and status of an individual’s health. Adverse childhood experience or ACE’s, are events that can be traumatizing during critical periods of growth and development and then can later appear in multiple chronic health conditions (7). Traumatic experience such as escaping the war in Syria, and living in a high-level stress environment without the proper nutrition, attention, and health protecting and health promoting actions may limit the quantity and quality of health of many children growing up in the Zaatari refugee camp. There are not enough protective factors to outweigh the risk factors (as displayed in Figure 3. “Zaatari Refugee Camp LCM versus “Prototype” LCM Health Trajectories”). Sadly, an average refugee will spend 17 years in the Zaatari refugee camp, investing their critical years of perinatal and peripubertal phases in the camp (3).

Taking a new look at the lives of refugees through the lens of the LCM, would allow modeling various experiences at various periods of life and could guide experts and policy developers in recommending policy and health course enhancements. They then could be prepared to create a “prototype” life course that would fill the areas of opportunity to improve the life quality by changing the life course of new and future generations born in the refugee
camp. In turn, this would provide insight into refugees’ projected health status in the later phases of life, as presented in Figure 3.

**Early Programming**

**Mariam’s Story**

Midnight shrieks are carried by the cool wind that presses upon Mariam’s belly. Her baby moves within her; pressing back, assuring her that her small luggage case is not the only remnant of her home. Her home appears as Lego blocks that scatter the streets that shared her last memories of her late husband, who was taken away by the Regime and never returned. Mariam
later discovered that her husband had been sentenced to death without trial by the Regime, which has left 16-year-old Mariam to fend for herself and their 5-month-old unborn baby.

Mariam’s family, who reside in the capital of Syria, are unable to travel to her side; as the path from the city of Damascus to the rural area of south Syria is too dangerous and death would be inevitable. Mariam has traveled by van to the outskirts of her village, and is met by groups of individuals whom are fleeing with her to safety. They must now walk many miles to the Jordanian border to safety.

As night passes, Mariam lies awake. She feels the sharp edges of rocks against her backside; she is soothed by the comfort of her unborn baby’s subtle sways— her mind begins the ongoing tumbling into a dark hole of anxiety. She begins the nightly interrogation of self-questions… “How am I going to eat without money? What am I going to do to make money? Who will help me raise my baby? Where will we live? Will I ever see my family again?” … Days pass, and the night questions remain unanswered.

Mariam finally arrives to the Zaatari Camp and begins to carve out her existence into the mass of bodies—only to be swallowed by the camp’s lifestyle. The life course of her unborn baby has already begun, but there—at the camp, is where her unborn baby will plant his feet to grow.

Premature Births

Mariam’s story is not atypical, but rather all too common and has become the social norm in many refugee camps in the Middle East, specifically Zaatari. One-quarter of the marriage registrants are below 18 years of age, and have had no formal education (8).
But the effects of stressful events, like in Mariam’s escape from Syria to the Zaatari camp, not only impact Mariam’s emotional, physical and mental status but that of her unborn baby as well. According to multiple studies, high levels of maternal stress increase the chances of spontaneous abortions, initiate preterm labor and deliveries, with direct effects on the fetus such as malformations, intrauterine growth-restriction (IUGR), and stunted growth in the early years (9). Overall, refugees have a 17% higher chance of preterm labor and delivery or premature births, than that of non-maternal refugees (10).

Premature births are defined as births occurring before the start of the 37th week of gestational age; a full-term pregnancy is considered giving birth after this period (9). Complications stemming from premature birth can directly affect newborn health status both acutely and chronically. Due to the time reduction, necessary for proper fetal internal organ development, the premature newborn can experience lung, heart, brain, gastrointestinal, blood, metabolism, immune system and temperature control issues.

Due to the immature respiratory system development, baby’s lungs have not fully formed causing great difficulty for the newborns to breathe; this acute condition can become chronic with the development of bronchopulmonary dysplasia and may need further medical attention (9).

The most common heart condition that premature babies experience is patent ductus arteriosus (PDA) (9). PDA is a continuous abnormal opening between two major blood vessels that travel from the heart (9). PDA defect usually resolves to closing on its own but if the opening remains and left untreated, too much blood will flow through the heart and cause heart failure (9).
Another important internal organ that suffers from premature delivery is the newborn brain. The earlier the baby is born the increased chances for brain hemorrhages, known as intraventricular hemorrhage (9). Most intraventricular hemorrhages resolve on their own if they are mild, and are considered acute. But if the hemorrhage is larger and continuous, then severe malformations such as permanent brain damage can occur. Infants with large brain bleeds that do not receive the proper medical attention, can result in an altered life path permanently—making them disabled forever, and ultimately lowering their quality of life (9).

Gastrointestinal issues may arise with preemies due to their immature gastrointestinal system formation. Potential serious complications such as necrotizing enterocolitis (NEC) can occur due to the delicate cells lining the intestinal walls which become injured after the preemies start feeding (9). Premature babies can decrease their chances of forming NEC, if they are solely breastfed (9). Proper breastfeeding education to mothers can alter the life course path of their offspring, if they gain knowledge and support for solely breastfeeding their preemie.

Metabolism issues can arise, such as a low level of blood sugar or hypoglycemia, due to the preemies lower storage of glycogen and the struggle of their immature liver’s conversion of stored glycogen into glucose (9).

Preemies are also more prone to infections due to their underdeveloped immune systems, increasing risks for life-threading complications, such as sepsis (9).

Due to the lack of body fat storage preemies are at an increased risk for developing hypothermia, which is a condition in which the body temperature plummets too low (9). Hypothermia can cause respiratory issues and hypoglycemia. Furthermore, the energy invested by preemies to increase body temperature can cause neglect in their growing cycle, and hinder
growth (9). Preemies with such conditions may need to remain in incubators, until they are large enough for their bodies to maintain temperature at an appropriate level (9).

Other serious chronic complications that are associated with premature births are cerebral palsy, impaired cognitive skills, vision problems, hearing issues, dental issues, behavior and psychological issues, chronic health issues in general.

Cerebral palsy occurs if there is an infection or inadequate blood flow or injury to a preemies brain development during intrauterine fetal development or outside utero. Cerebral palsy is marked by a disorder of muscle tone, posture and movement (9).

When comparing premature babies to full term babies, preemies are left behind reaching to accomplish developmental milestones their prematurity hasn’t let them be prepared for their. Preemies are at increased risk of having learning disabilities upon entering school (9).

Preemies have an increased chance for vision issues due to retinopathy of prematurity in which the blood vessels located in the back of the eye, or retina, experience overgrowth (9). Such an overgrowth of the vessels can cause scarring and even can cause the retina to be pulled out of the proper position. If retinal detachment or displacement occurs, permanent vision impairments such as blindness can occur (9).

In general, due to their immature audio component development, premature babies are at increased risk for some degree of hearing loss, and must be properly checked and medical intervention may need to occur to reduce the chances of audio disability (9).

Preemies also face increased chances of dental development issues such as delayed tooth eruption, tooth discoloration, improperly aligned teeth, and further issues marked in the later years of life (9).
Behavior and psychological issues, such as attention deficient hyperactivity disorder (ADHD), with preemies have been remarkably higher when compared to full term deliveries (9).

Lastly, due to the under development of premature babies, chronic health issues are likely to occur in which prolonged hospital stays are necessary. Preemies remain at increased risk for infections, asthma, and feeding issues (9). Premature babies are also at an increased chance for sudden infant death syndrome (SIDS) (9).

The unborn baby's life course has already begun with multiple external biological factors such as maternal stress, leading to premature births with sub-conditions that will alter the path of the infant’s future. During these critical periods, growth and development blueprints are drawn and followed into childhood and adolescent years.

**Key Environmental Factors**

As we enter into the early years of the LCM of a baby being born in the Zaatari refugee camp, evaluation of some of the key environmental factors and their impact on the refugee LCM is warranted.

Although there are multiple environmental factors that are key in the continuous spectrum and trajectory outcome of the LCM of refugees residing in the camp, some specific environmental factors that are more important than others include: a access to clean water, healthy foods, and indoor air pollution.

An essential element for human survival is water. Humans cannot survive more than three days without ingesting water. Water it is not only used for ingestion but for hygienic purposes and handwashing. Handwashing is the number one public health primary prevention approach to
reduce disease incidence. The current water crisis in the Zaatari camp, and other refugee camps in Jordan, is due to the geographical region situated in dry, desert locations.

Jordan is one of the top 10 water scarce countries globally (11). Jordan hosts more than 1.4 million refugees; causing a nationwide strain on already scarce water resources. Such demands have caused multiple water pathways to become contaminated via sewers (11). There is also a lack of proper sanitation due to insufficient resources, such as chlorine, which encourages outbreaks of waterborne diseases such as cholera, typhoid, and hepatitis (11).

Access to healthy foods is also considered significant in the trajectory outcome of the adult and older life phase. 86% of Syrian refugees live below the Jordanian poverty line of 68 JOD (approximately, $95 US) per capita per month (12). With the majority of refugees residing below the poverty line, it is quite difficult to attain nutritional meals on a continuous basis. Sources such as the United Nations High Commissioner for Refugees (UNHCR) and the Jordanian government provide refugees with food vouchers which they can redeem at their local food market (12). Like most United Nations humanitarian agencies, the UNHCR relies entirely on voluntary contributions from government corporations and individuals (12). Due to the increasing demand on food, the UN's world food program for the Middle East and North Africa region, have recently been forced to decline 360,000 refugees living in the camps from any sort of assistance, as well as cut food rations for more than 1.5 million refugees (12). Poor nutrition usually occurs due to limited resources; refugees either eat less of healthy foods or food in general or more foods which have no necessary nutritious benefits (18). Therefore, picking healthy food choices is a method of primary prevention to decrease chances of illnesses and diseases stimulated by unhealthy foods such as, cardiovascular diseases, and diabetes.

Furthermore, unhealthy food choices can awaken silent genetic or environmental encouraged
diseases; hence secondary prevention methods of avoiding unhealthy foods and awakening silent
diseases/illness are also difficult.

Cooking the scarce, traditional healthy food choices without modifying the preparation
methods is also creating hazardous risks for refugees. Refugees are cooking indoors over an
open flame causing hazardous indoor air pollution, known as “black smoke.” “Black smoke”
contains particulate matter and carbon monoxide and can be very harmful to a growing infant.
Infants’ unique vulnerability is due to the fact that youth inhale more pollutants per kilogram of
body weight when compared to adults. Furthermore, infants’ airway irritation from the pollution
results in proportionately greater airway obstruction than adults. In general, refugee camps are at
higher risk for indoor air pollution due to insufficient resources such as relatively clean burning
fuel electric/gas powered stove tops and clean indoor air circulation. The side effects of black
smoke can be crippling and morbid. Morbidities can occur in later life stages, such as
adolescence and adulthood due to the exposures in infancy. Recorded deaths due to diseases
caused by indoor pollution or “black smoke,” include (Figure 4): stroke 34%, ischemic heart
disease 26%, chronic obstructive pulmonary disease (COPD) 22%, pneumonia 12%, cancer 6%
(13).
Socioeconomic Status (SES)

The level of socioeconomic status (SES) and the direct and indirect effects on the quality of life is essential to consider when evaluating current and future health outcomes. SES is measured with multiple variables compared and can be applied at an individual and community level (14). Variables, such as level of education, occupation and income can alter the SES status either raising the level, which in turn, increases the quality level of life, or decrease the SES level which also decreases the quality level of life (14). The quality level of life, determined greatly by the SES, negates the health status of individuals and communities, alike. Individuals and communities that have higher levels of education, income and better occupations, have decreased chronic diseases, healthier social, emotional, mental and physical behaviors and outcomes, as well as less premature deaths; when compared to those individuals and communities with lower education, and income and low-quality occupations (14).
When measuring the SES of Zaatari community, the level of education, occupations and income of the mass are taken into consideration. According to the UNHCR, 5.2% of refugees between the age young people, 19 to 24 attended a university in Syria, and only 1.6% successfully graduated (14).

As mentioned earlier, an estimated 55% of inhabitants are below 18 years of age, making the 3 schools easily over populated, and many school aged children are unable to acquire the proper education (14). Research suggests that the lower education status in childhood, the lower the quality of health and life in the later years into adulthood (14).

Of the thousands of young people in the Zaatari camp, the majority need skills training and occupation opportunities to assure steady income (12). High unemployment rates have occurred due to multiple factors, such as Jordan's overall unemployment rate being amongst the highest in the Middle East, roughly estimated at 40% unemployment rate (12). Refugees are also required to apply and attain a “worker” permit to work outside the camp, and are not allowed to leave camp premises without prior permission (12). Due to the overall high Jordanian unemployment rates, “worker” permits are scarce (12). As denoted earlier, 86% of refugees in Zaatari camp live well below Jordanian poverty rate (12).

Young refugees are also at an increased risk for risky behaviors such as use of tobacco products, drugs, alcohol, gang and criminal associations within the camp (14). Due to the high rates children not attending school, children become vulnerable targets for district gang members’ recruitment and criminal behavior (15).

According to the CDC, “SYRIAN REFUGEE HEALTH PROFILE,” Syrians are amongst the highest Middle Easterners to utilize tobacco products, such as cigarettes and hookah. It is estimated that over 60% of males and 17% of adult females utilize tobacco in
forms of cigarettes and hookahs (15). Furthermore, tobacco products are used by 30% of male adolescents and 15% of female adolescents (13-15 years of age) (19). Tobacco products have been linked to major diseases, such as heart disease, stroke and lung cancer (15).

In 2014, a comprehensive mental health consultation survey was conducted and 19,511 adult refugees from Zaatar camp were evaluated. 33% of patients admitted to alcohol and other substance abuse disorder (25). "Alcohol and other substance abuse disorder," ranked the highest amongst the other "Proportion of mental health consultations," survey, while presence of a "severe emotional disorder," ranked second, at 27% (15). Alcohol and drug abuse overall lowers the body's immune system, causing great vulnerability to contract illnesses such as pneumonia and tuberculosis (15). Furthermore, alcohol abuse is linked to disruptions to vital body organs, such as the brain, heart, liver and pancreas; cancers such as mouth, esophagus, throat, liver and breast have also been linked (15).

Combing all factors, the overall SES of Zaatar camp is low. Low SES are equated to lower quality of life, hence lower health statuses in the present and future. The Zaatar community is more prone to chronic diseases/illnesses as there are no present means and mediums to treat acute diseases/illnesses and stable primary prevention approaches to combat the occurrence of illnesses.

**Health Trajectories**

As mentioned earlier, the LCM is measured on a continuous spectrum from preconception to death, and has a direct impact on health trajectories. *Figure 3. “Zaatari Refugee Camp LCM versus “Prototype” LCM Health Trajectories”* presents two distinct life courses, the blue line indicates a proposed trajectory of individuals who were conceived, and were raised
through childhood, adolescence, adulthood and later adulthood in a “prototype” LCM that is heavily influenced by implementations of public health interventions.

The orange line signifies a health trajectory of individuals who were conceived, and were raised through childhood, adolescence, adulthood and later adulthood in the Zaatari refugee camp. Early life critical periods and early programming occur within these two environments.

Not surprising, there are more risk factors (red arrow) associated with life course of an individual being born and raised in the Zaatari refugee camp versus that of an individual in a “prototype” LCM. The risk factors associated with the Zaatari refugee camp LCM continuously deter health, without sufficient protective factors to balance or surpass poor health status as displayed in the table below, Table 1. “Prototype” Protective Factors VS. Existing Risk Factors in Zaatari Refugee Camp.

<table>
<thead>
<tr>
<th>“Prototype” Protective Factors</th>
<th>Risk Factors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sufficient &amp; high quality perinatal care</td>
<td>Insufficient &amp; high quality perinatal care</td>
</tr>
<tr>
<td>Primary prevention prenatal techniques to reduce chances of premature delivery and fetal anomalies/growth restriction</td>
<td>High levels of maternal stress</td>
</tr>
<tr>
<td>Sufficient (access) and clean water supply</td>
<td>Increased incidence of premature delivery</td>
</tr>
<tr>
<td>Sufficient (access) to health foods</td>
<td>Increased incidence of fetal anomalies/growth restriction</td>
</tr>
<tr>
<td>Sufficient (access) to medical/health attention (including primary and secondary prevention)</td>
<td>Scarce supply of clean water</td>
</tr>
<tr>
<td>Sufficient and continuous tertiary access with proper continuous medical/health care and supply</td>
<td>Scarce supply of healthy foods; “Food desert”</td>
</tr>
<tr>
<td>Positive individual and community behaviors (e.g. obsolete-minimal violence, and risky behaviors, etc.)</td>
<td>Medical/health attention inequity</td>
</tr>
<tr>
<td>Above poverty paygrade and living standards, with equal employment opportunities</td>
<td>Increased incidence of “risky behaviors” on an individual and community level</td>
</tr>
<tr>
<td>Equal access of education with sufficient classroom sizes and optional additional attention to education</td>
<td>Alcohol and substance abuse, Tobacco use</td>
</tr>
<tr>
<td>Low level of individual/family/community stress</td>
<td>Poverty</td>
</tr>
<tr>
<td></td>
<td>Lack of employment opportunities</td>
</tr>
<tr>
<td></td>
<td>Lack of primary prevention methods for illnesses (due to insufficient access to medical/health care)</td>
</tr>
</tbody>
</table>
Risk factors that deter the health of refugees being born and raised in the Zaatari camp include:

1) Perinatal: Increased chances of premature birth and associated diseases/illnesses that deter present, and future health; as well as, insufficient prenatal care.

2) Key environmental factors: access to clean water, healthy foods, and exposure to hazardous indoor air pollution.

3) Social determinants of health: socioeconomic status of individual and community, including: education, occupation, and income. Individual risky behaviors such as tobacco, alcohol and substance abuse; and mental health status.

Although the risk factors mentioned above are not inclusive, they are important factors that contour the LCM of refugees growing up in the Zaatari camp. These factors are also valuable to the continuous health spectrum. Refer to Figure 7. The Current “First 1,000 Days” and Health Trajectory of Infants Birthed in Zaatari Refugee Camp, for further information.
Figure 7. The Current “First 1,000 Days” and Health Trajectory of Infants Birthed in Zaatari Refugee Camp.

Public Health Interventions

Public health interventions to enhance the LCM of Zaatari refugees should be initiated in the first 1,000 days or the perinatal phase, as mentioned earlier this period is crucial to the
success of healthy living. The following description details a created public health program intervention, “The First 1,000 Days Program,” that contours to the needs of Zaatari refugees:

“The First 1,000 Days Program”

Establishing a program that encompasses all obstetric and postpartum services to mother and baby refugees in the first 1,000 days of pregnancy or until the infant turns 2 years of age.

Clinic Accessibility

First erecting a clinic in which the program will be offered, in a localized area within the camp that is easily accessible for the targeted patient population. The facility must be placed within camp grounds, preferably in the center. The facility must not be located outside camp, as patients and other refugees are restricted from leaving camp premises by Jordanian officials. Transportation system must be in place for patients who are unable to reach the clinic by foot. Vehicles must be restricted to emergency needs and only to that of patients. Vehicles must also be well equipped with supplies and staff for emergency procedures completed outside of the clinic. Clinic must have access to sanitary water and electricity on a continuous basis.

Clinic Medical Procedures and Protocols

Specific medical and health procedures and protocols must be addressed and complied by clinic officials. Credible health personnel should be practicing, and providing patient care. Proper medical equipment and supplies should be utilized and strict guidelines provided by the Occupational Safety and Health Administration should be abided by from all staff members and personnel. Occupational Safety and Health Administration (OSHA) was created by the United States of America Congress in order to help protect employees by creating safer work
environments by creating regulations which employers must abide by. Overall, OSHA regulations have significantly decreased employee injury, illness and death rates by over half in the US since its creation in 1971 (16).

An OSHA officer must be appointed in the clinic. OSHA officer must have thorough knowledge of OSHA regulations, and must assure regulations are applied by clinic staff as parallel as possible to those applied in the US. OSHA officer is responsible of educating staff on regulations and due to the high number of patients, OSHA officer is recommended to evaluate staff and clinic to assure OSHA regulations are followed every 6 months. OSHA evaluation of staff should be recorded and maintained for quality assurance purposes and addressing misconceptions that staff may have regarding the standards. OSHA training must be included when a new employee is hired.

Assuring an OSHA officer is appointed in the clinic will assure staff are protect and able to provide the best, within ability, medical services to patients.

Medical Records

All patient medical records must be kept in a centralized location in an organized manner, in which accessing patient medical records is not disruptive or time consuming to staff. Furthermore, medical record keeping is essential for medical quality assurance, for example: reducing prescription duplication, or medicine crossing, identifying high-risk patients via medical history such as previous premature deliveries, number of cesarean procedures and social issues, risky behaviors, etc., aids the staff members to provide enhanced medical/health care and better birthing outcomes for both mother and baby.
Medical/Health Protocols

Medical and health protocols must be addressed in a written document accessible to staff in order to assure medical/health care provided to patients are uniform. New patients, especially those that are arriving to Zaatari camp must be provided “new patient” appointments, in which an extensive patient history must be documented in medical records. Patients must also be scanned by ultrasound to confirm gestational age. New patients must then be evaluated and categorized into either “low-risk” or “high-risk” patients. Although the vast majority of patients in the camp could be considered “high-risk” due to the current multitude of risk factors; patients who would be categorized in the camp’s “high-risk” group are those who may need to seek tertiary care for their newborn in which the clinic does not have the capability to provide. Therefore, “high-risk” patients would be seen, but their records would be shared with the camp hospital. Furthermore, weekly “high-risk” conferences would occur between the clinic personnel and the local camp obstetric staff personnel. The “high-risk” conference would discuss all patients considered “high-risk” and their medical records. Birthing plans for these patients would also be addressed and documented—and shared with the patient at the next appointment.

After patients are categorized into low and high-risk patients; patients are then further placed into groups of 12 to 15 patients based on how far along the patient is in her pregnancy or gestational age and low or high risk status. Low-risk patient appointments will be organized similar to a short course or educational session. A credible medical/health professional will lead the class and provide patients with educational material. Patients will be responsible for a large part of their medical attention and are responsible to maintaining a “health” journal which includes their food diary. Each mini-course or patient appointment, will end with an interactive
session in which patient and medical staff will discuss any questions or concerns patients may have. Grouping patients in this manner will not only provide timely medical care, but also construct an additional support system for patients and build a stronger community culture.

Patients who are considered “high-risk” will be grouped in 2-3 patients, if possible, with the same or similar issues. The following *Figure 4*. Patient categorization & gestational age grouping protocol map, provides further clarification of how patients are categorized by low-and high-risk statuses and grouped into gestational age.

*Figure 4*. Patient Categorization & Gestational Age Grouping Protocol Map

*Education*
Patients in all low-and high-risk groups will be provided education, and resources on important topics such as nutritional food choices amongst the existing foods available to them. Patients will also be educated on the hazards of “black smoke,” created by cooking indoors over an open fire (refer to Figure 5. Cooking indoors educational flyer, for an example of material provided to patients). Patients will also be educated on the importance of healthy behaviors, such as avoiding substances that are harmful to fetal and maternal health, as well as their family’s health. Immense concentration will take place concerning the harmful effects of products such as tobacco, hookah and second-hand smoke, alcohol and drug abuse.

Mental health issues that have long been stigmatized in the Middle Eastern culture and community, such as depression, anxiety and post-traumatic stress disorder will be brought to light during group sessions—open discussions and healthy coping mechanisms would be provided. Educational brochures, such as Figure 6. Healthy pregnancy, would be provided to patients in their native language, Arabic, to take home and refer to. Patients would also be encouraged to take the important educational points received in the course home to share with their loved ones. Furthermore, patients would be educated on the early signs of labor, and the transportation route to seek medical care.
**Figure 5. Cooking Indoors Educational Flyer (13)**

**FACTS**

- There are three main causes: smoke, heat waves, and dust, leading to breathlessness and suffocation.
- The smoke causes serious health effects. Indoor cooking smoke is 100 times more toxic and dangerous than acceptable levels for fine particles.

According to WHO, 43.3 million people die prematurely due to indoor cooking.

**Who is at risk?**

Women and children (as they spend the most time near the domestic home)

Exposure to household air pollution almost doubles the risk for childhood pneumonia. Over half of deaths among children less than 5 years old from acute lower respiratory infections (ALRI) are due to particulate matter inhaled from indoor air pollution from household solid fuels (WHO, 2014).

**Methods & Aid**

- **Methods**
  - Assure fan and proper ventilation occurs if necessary cooking indoors.
  - Avoid cooking indoors, or in a closed shelter.
  - Light cooking fire outdoors and away from children. Never leave children unattended near open flames.
  - Ensure that smoke has an “escape” route and is not accumulated into one space.
  - While cooking with open fire assure you are not directly inhaling smoke caused by the burning flames.
#1 RULE!
Always wash your hands.
Proper hand washing is an essential element of maintaining healthy for you and baby. Steps to proper hand washing:

1) Wet your hands with clean water (warm or cold) and apply soap.
2) Lather your hands by rubbing them together with soap. Lather the back of your hands, your fingers and under your nails.
3) Scrub your hands for at least 20 seconds. (Sing “Happy Birthday” song twice)
4) Rinse your hands with clean, running water.
5) Dry your hands with a clean towel or air dry them.

Wash your hands often, as much as possible (the more times, the better). Avoid putting your hands in your mouth/tips/teeth.

Proper hand washing is the number 1 technique to avoid sickness.

Cdc.gov

Pregnancy Tips:

- For sleep, lay down on your left side. To breathe better, and avoid getting nauseated.
- Regularly exercise to manage weight. Mother should gain 20 to 25 lbs per pregnancy.
- Always wear a seatbelt when riding in a vehicle. Protect you and your baby.
- Always brush and floss your teeth twice a day. Avoid sugary foods that may cause cavities or other dental issues.

Fun Facts:

- Baby reacts the same way to the foods you eat, as you do.
- Baby can hear and see light starting in the second trimester.
- Baby’s heart rate is between 110 to 180 bpm (normal).

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Your Healthy Pregnancy

External
Ultrasound

Patients will also receive two baseline ultrasounds. The first during the “new-patient” appointment to identify gestational age, which is also called a “dating” ultrasound. The second will occur around 20 weeks of gestation, or if patient is further along than 20 weeks then patient should receive ultrasound as soon as possible, and is called an “anatomy screen.”

Providing obstetrical ultrasound screens increase fetal anomaly detection 10-fold, and can also detect life-threatening placenta and abnormal embryonic implantation sites such as...
ectopic pregnancies. Ectopic pregnancies are defined as embryonic implantation sites outside of the normal uterine location. Ruptured ectopic pregnancies can be fatal depending on the location site and if medical treatment is delayed, as it can cause maternal hemorrhaging. Obstetric ultrasounds are also useful for the detection of placenta location, and can detect morbid abnormal placentation, such as vasa Previa. Vasa Previa is when the placenta cord insertion implants over the entire internal cervical ossification, disrupting the fetal route during delivery, and ultimately causing the vessels to rupture and mother bleeding to death.

Obstetric ultrasounds can also detect “high-risk” fetal anomalies. Although ultrasounds can detect anomalies immediately, intervention does not occur; rather prepping for delivery day and assuring the correct resources and supportive clinicians are present to intervene and treat are higher priorities. For instance, if a fetus was discovered to have a cardiac abnormality, the mother would be counseled and during the time of delivery a pediatric cardiac surgeon would be present to treat the newborn; whether it is immediate surgery or monitoring. Furthermore, the mother would be well educated in the process and protocols for her newborn, hence minimizing stress and anxiety levels of family.

Internal ultrasound examination can also detect maternal cervices that are prematurely opening and with medical intervention, can halt early signs of labor; essentially allowing the fetus to remain in the womb and prolong the pregnancy. Hence lowering the chances of premature deliveries, and enhancing the quality of life of the infant.

After a patient has received her “anatomy screen” ultrasound, she may be moved into the “high-risk” group dependent on the ultrasound results.

Postpartum Care & Infancy
The program will also provide mothers’ and babies care after maternal delivery, or postpartum care. Mothers will be evaluated for post-partum depression, if any and be aided, if needed. Whereas infants will be evaluated until the age of 2, for major milestones, as well as provided medical attention, such as appropriate vaccinations. Similar to that of the obstetric groups in the prenatal care division, mothers and babies will be offered weekly educational classes. Mothers and babies will be again grouped by offspring age and provided educational resources.

Breastfeeding focused classes will be offered, where mothers and babies, with the aid of clinic staff, will have a hands-on approach to assure that baby is properly breastfeeding. Mothers will be educated on the importance of breastfeeding and the direct positive effects breast milk has on their offspring health. Some of the benefits of breastfeeding that should be discussed include: breastmilk strengthens baby’s immune system, fighting off diseases, infections and illnesses (17). Research also suggests that breastfeeding may protect the growing infant in the future to combat obesity, diabetes, asthma, colitis, eczema and cancers (17). Breastfeeding is also linked to decreasing chances of sudden infant death syndrome (SIDS) (17). Breastfeeding has an immense and profound positive affect on infants, but also has positive effects for mothers, such as: reducing the risk of ovarian and breast cancer and providing natural contraception in the first 6 months post-delivery (17).

Mothers and babies will also have space and time to engage in interactive activities, such as reading, playing with puzzles and other educational games. Although resources in the camp may be limited, mothers can invest time into their offspring by giving them their ultimate attention and developing a healthy bond that can serve a lifetime for positive embracement and development.
Public Health Interventions Continued

While developing and implementing a program that provides services and education to mother and baby from 0 to 2 years of age, it does not provide solutions to other important issues that remain to directly and indirectly affect early childhood. Important issues such as continuous access to clean water, healthy foods, and camp socioeconomic status.

As mentioned earlier access to clean water is crucial from an individual and public health standpoint. Without the access to water, the camp’s community health is jeopardized—and poses a significant infection and disease risk. Creating a “Safe Water” policy that requires refugee camps to have access to clean water on a continuous basis in major facilities within the camp that is equally accessible by all refugees should be required. Although the Jordanian government has identified that water resources are scarce, investing refugee driven funds in safely sanitizing reused water, would be financially conserving, as well as an adequate measure in utilizing existing resources. Furthermore, an efficient transportation system for the water to be directed to the refugee camp to assure continuous access of water, should be included in the “Safe Water” policy. The water transportation system should be well-planned, and include continuous water transportation system maintenance to further assure that access to water in the camp is uninterrupted.

As discussed earlier, the Zaatari refugee camp is located in a dry desert region; one of the positive aspects of the camp’s location is the surrounding uninhabited land. Such land can be utilized by the Jordanian government to allocate monies donated to the refugee cause, to develop a community garden maintained by employed refugees. The community garden can include edible plants that do not necessarily need much rainfall and can flourish in extremely high
temperature days. Such vegetables that would survive harsh desert climates during cold seasons include: beets, broccoli, cabbage, carrots, lettuce, onion, pea, potato, radish, spinach and turnips (18). Vegetables that would survive harsh desert climates during warm seasons include: beans, cucumber, eggplant, melon, pepper, pumpkin, squash, corn, sweet potato and tomato (18).

In addition to the water and healthy foods access crisis, individual and community low SES must be addressed. Individuals residing within the camp compose the camp’s community. Hence, individual education, occupation and income are important and have direct effects on the community’s overall SES. In raising the community’s SES, assuring an educational encouraged culture is present within the camp and amongst the community. But encouraging the pursuit of education in the camp will not drastically decrease or eliminate the statistical high wage of low level education. Refugees will not be able to focus their new profound drive of heightening their levels of education if they are not allowed to venture off the refugee camp premises. Once again, refugees are forbidden to leave camp grounds without the proper permitted documentation provided by the Jordanian government. Even if refugees successfully and patiently await approval to leave the camp, refugees are not allowed to attend schools, including colleges and universities, without prior approval of the Jordanian Ministry of Education and government. Authorizations by the Jordanian Ministry of Education and government for refugees rarely occur. So paths for refugees seeking higher education are difficult, and often lead to an abrupt dead-end.

An “Equal Rights to Education” policy must be formatted to allow refugees who desire to continue their education in Jordanian schools, which includes all levels of education. Refugees who desire to attend colleges or college- level courses that teach a skills training course, should be allowed. Refugees who do attend educational institutions beyond high school, should receive
subsidized student loans from the government to assure tuition and necessary educational supplies are provided to the student. Subsidized loans should be included in the “Equal Rights to Education” policy. Furthermore, and if the Jordanian government desires, refugee students may also need to sign a 2-year post graduation contract that assures refugee students will work within Jordan to further enhance the economy. If the Jordanian government desires to mandate a 2-year work contract, the Jordanian government should also assure that the new graduate and worker receive a Jordanian citizenship. Granting graduating refugees with a Jordanian citizenship will not only encourage refugees to seek higher education, but also stimulate the Jordanian economy.

Understandably, the Jordanian country faces high rates of unemployment, hence the difficulty of granting refugees work permits. But allowing refugees to seek higher education, will also boost job opportunities. Job opportunities are also created specifically with focus on refugees, such as opening the clinic and the implementation of the “First 1,000 Days Program;” such job opportunities can target the female refugee population. As it is common in the Middle Eastern culture that women prefer women health and medical clinicians, as it is frowned upon if a male practitioner must touch or see a woman’s body bare. Also, with the creation of the community garden, employment opportunities for refugees would be prevalent as creation, and maintenance is necessary for the success of the garden. Although these are some of the alternatives that refugees could seek gainful employment, it does not serve the remaining masses of unemployed refugees.

A policy for “Equal Rights of Employment and Pay” should be implemented and refugees should be granted working permits in the appropriate field of work, furthermore refugees should be granted equal pay rights for equal work output as their fellow Jordanian brother. Employers if desired, can place refugee workers under a 90 day probation period, and
may if desired, under the “Equal Rights of Employment and Pay” policy, pay the new hire an 
entry level salary. The probation period is allocated for the employer to review employee work 
skills, and assure work performance is up-to-par for company standards. Probation period is 
further divided into increments of 3-30 day marks, in which the employer must document an 
evaluation of the new hire work progress, knowledge and production quality after every 30 day 
increment. If the employer identifies areas of opportunity in which they feel that the new hire can 
 improve on, the employer is responsible for counseling and discussing the areas with the new 
hire, and further documenting the evaluation and adding any additional comments. The 
document must also require signatures of employer and employee, and must state that the 
employee understands what he/she has been counseled on and the recommendations provided by 
the employer. After the 90-probation period has ended, the employer is required to increase the 
refugee salary to that of a Jordanian employee matching résumé profiles, for example equivalent 
work experience, education, etc. The encompassing “Equal Rights of Employment and Pay” 
policy, will assure that refugees and employers are equally protected. Furthermore, the income 
status of refugees will profoundly increase, hence improving the overall SES of refugees and 
their communities.

Implementing policies such as the “Equal Rights to Education” and “Equal Rights of 
Employment and Pay” policy, will diminish barriers that refugees commonly face when seeking 
to improve their individual SES by allowing equal access to education, better jobs that in turn 
provide better pay.
“Prototype” LCM & Health Trajectory

With the implementation of the public health interventions mentioned, the LCM of a refugee being born and raised in the Zaatarí camp would be drastically different and in turn modify their health trajectory as displayed in Figure 8. “Prototype” Public Health Interventions during the “First 1,000 Days” and Health Trajectory, below.

The public health intervention of developing and implementing the “First 1,000 Days Program,” which focuses on the healthy development of youth during critical period in the infant’s life course; improves the future health of the infant in later phases of life. For example, the program focuses on multifactorial enhancements of perinatal and postpartum care, ultimately improving birth and delivery outcomes, as well as postpartum care for mothers and babies to the age of 2.

Furthermore implementing the previously mentioned policies will aid in creating a fertile environment for successful growth and development of camp youth. The policies will chronically serve the community and individuals living in the community, and will continuously enhance future generational health trajectories.
Mariam’s Story Continued...

As the sun peaks amongst the eastern horizon, Mariam feels a comforting warmth upon her face. She peers at the piled line behind her and admires the colorful headscarves that dot the golden desert screen. Such warmth and comfort soon diminishes as she focuses along the northern distance; where thick clouds of smoke roar from the crisp skyline, but quickly disappear into the sun’s growing light.

She feels cool droplets of sweat traveling from her damp hair that peeks from the sides of her headscarf. She is awakened from her steady gaze, by a gentle, yet hurried touch on her
shoulder. She turns to face an elderly woman who gracefully smiles and points, signaling her to the registration worker at the entrance of the camp. The camp worker registers Mariam and provides her with information regarding her tent plot, UN care package that includes hygienic items and a box of food. The camp worker then signals Mariam to a secluded area, restricted only to pregnant female refugees.

There Mariam sits with other pregnant women who await their turn to be checked and registered to the “First 1,000 Days Program.” Mariam is finally checked by a female clinician, and is asked various questions that can denote the onset of premature labor such as:

- How far along do you think you are?
- Have you felt any uncommon pain or pressure in your abdomen?
- Have you leaked any fluid or bled vaginally?
- Do you believe you have experienced onset of early labor?

The clinician is required to ask all incoming pregnant refugees, to reduce chances of the premature births. If the clinician suspect’s patient is experiencing premature labor, the patient is immediately transferred to a medical facility for immediate medical intervention, to postpone labor.

Luckily, Mariam is not experiencing any signs of early labor and is scheduled for a “new-patient appointment,” at the local clinic in 3 days. Mariam is provided a “First 1,000 Days Program” informational package and is advised to have all paper work completed to the best of her ability, before arriving to her appointment. The clinician further explained the clinic’s strict time policy, and due to the disproportionate discrepancy ratio between medical staff and patients, tardiness is not tolerated.
Mariam quickly settles into her new tent, andunpacks her small luggage case. She neatly stacks her folded clothes in a corner and remembers her neighbor’s advice on securing her food supply so rodents wouldn’t discover it.

As always Mariam lays awake, her brain tossing and turning—but this time, it isn’t the nightly interrogation of self-questions, rather the excitement of her first appointment at the clinic tomorrow. Mariam longs to meet new friends, in hopes to fill the aching emptiness caused by the war, her husband’s death, and the loneliness painted by the distance between her and her family in Damascus.

The following morning Mariam arrives at her “new-patient” appointment, she is scanned by ultrasound that confirms she is 5 months pregnant, or 20 weeks gestational age. The sonographer detects that Mariam’s internal cervix os or birthing canal, is completely funneling or opening, when pressure is applied at the top of belly to mimic that of gravity. Although Mariam has felt pressure, she has associated it with the excessive walking she did when escaping Syria. She also assumed that what she felt was normal, as it was her first pregnancy and she was not familiar with identifying normal and abnormal pregnancy variants.

Immediate medical intervention occurs: Mariam is transported to the hospital were an emergency cervical stitch is placed to close the cervix and assure that premature birth does not occur. Mariam is ordered to remain in moderate bedrest for a couple of weeks. Although Mariam’s condition could be considered “high-risk” for some, she is categorized as low-risk and grouped with pregnant women around her gestational age. Mariam’s clinician gives her tent number to the pregnant ladies in her group, and encourages them to visit Mariam while she is on bedrest.
Mariam is surprised when she opens the entrance of her tent, and sees multiple pregnant women carrying containers of food. She is rejoiced by her company, and quickly develops close friendships with a few of the ladies. Her new friends did not only have their pregnancy in common, but experienced similar turmoil’s in Syria, having lost their loved ones and having become alienated from their families. Mariam’s friends become her focal support group throughout the remainder of her pregnancy, and the delivery of her baby.

Mariam delivered a healthy baby full-term, thanks due to the emergency cerclage placement. Mariam continues to attend courses at the clinic, included in the “First 1,000 Days Program,” that focus on her new baby’s positive developmental growth.

Although Mariam may become anxious of the future at times, she is reminded by her newfound support group and positive environment that the future has hope. As her newborn baby plants his feet in the soils of the camp; Mariam showers him with education, clean water, healthy foods, and equal opportunities to flourish.

Conclusion

As long as the act of war continues to persist in this world, the refugee crisis will remain to be a major public health issue. And even though the world of public health cannot control the government officials who choose to blindly wage war on nations, causing millions of innocent citizen mortalities and chronic crippling morbidities; the public health world can apply public health approaches and interventions to improve the quality life of refugees.
References


