Problem of protein energy malnutrition in weaning infants

This paper will examine the protein energy malnutrition problem amongst weaning children in Niger. By using secondary sources and by looking into precedent practices by different organizations to improve the situation, it will finally conclude with health promotion nutrition intervention plan which will include a collaboration and partnership with stakeholders who will as well have a great impact on the population's health determinants. For this project we will take the role of three nutritionists hired by Médecins sans frontiers (MSF) to establish a best practice and protocol standardized health system in line with the solution of treatment.

Firstly this paper will provide a background on the country and the subject of protein-energy malnutrition within different regions. Different existing intervention programs will be presented together with a personal health promotion intervention plan. This will be followed by the determinants that will mainly influence the program and its objectives. Secondly the strategies and practices of the intervention plan will be explained in depth. Thirdly, this project will present to collaboration and partnerships with different stakeholders in order to finally indicate how this programs is creating community capacity.

Background context:

Niger:

Niger, or officially named the Republic of Niger, is located in Western Africa covering a surface of 1. 270. 000 km2 of which 80% consists of Sahara. Neighbouring countries are Nigeria, Benin, Burkina Faso, Mali, Algeria, Libya and Chad. Being landlocked it is one of the hottest countries of the world. Fifteen million people live in Niger of which only 5% in the capital Niamsey.

The population density is only of 12. 1/km2. The population is characterized by its fast growth rate (3rd rank worldwide) and has the number one highest birth rate and fertility rate of 7. 2 births per woman which means that 49% of the Nigerien population is under the age of 15. Known also to be one the poorest countries in the world; Niger’s economy has mainly been undercut by the drought cycles, desertification and the strong population growth (Niger, 2010).

Protein-energy under nutrition:

Protein -energy undernutrition (PEU), previously called protein-energy malnutrition is an energy deficit due to chronic deficiency of all macronutrients (which are proteins, fats and carbohydrates). In developed countries, PEU is common among the institutionalized elderly or among patients with decreased appetite. In underdeveloped countries protein malnutrition occurs because of the local diet with protein poor cereal products (Morley, 2007).

The classification is determined by calculating weight as a percentage of expected weight per height using international standards. (Normal: 90-110%; mild PEU: 85-90%; moderate: 75-85%; severe: <75%). In children, chronic primary PEU has two common forms depending on the balance of no protein and protein sources of energy. The first form, Marasmus (also called the dry form of PEU); causes weight loss and exhaustion of fat and muscle. The second form, Kwashiorkor (also called the wet, swollen form of PEU), is associated with premature abandonment of breastfeeding, which typically occurs when a younger sibling is born, displacing the older child from the breast. This phenomenon is also called the " second child spell". Thus,

children with Kwashiorkor tend to be older than those with marasmus (Morley, 2007).

Pathophysiologically, the initial response to PEU is decreases metabolic rate. To supply energy, the body first breaks down adipose tissue or body fat. When these tissues are used up, the body may use protein for energy; visceral organs and muscle are broken down and decrease in weight. Loss in organ weight is the greatest in liver and intestine, intermediate in the heart and kidneys and least in the nervous system (Morley, 2007). Total starvation however can be fatal in eight to twelve weeks thus certain symptoms of PEU do not even have time to develop. Patients with protein-energy undernutrition often also have deficiencies of vitamins, essential fatty acids and micro nutrients which contribute to their dermatosis (skin disease) (Scheinfeld, 2010).

Worldwide, the most common cause the malnutrition is inadequate food intake. Another very significant factor however is the ineffective weaning secondary to ignorance, poor hygiene, economic factors and cultural factors. The prognosis is even worse when PEU occurs with HIV infection (Niger, 2005).

Protein-energy malnutrition in Niger:

In Niger, the diet of most children is extremely monotonous, usually consisting of millet based porridge although the diet of older household members might be more diverse. This monotonous diet leads to nutrient deficiencies and consequently diseases such as Kwashiorkor and Marasmus develop.

In 2005, a survey was conducted by MSF which stated that one child on five suffers from malnutrition. That year, the mortality rate of children under five exceeded the emergency threshold; 2 deaths per 10. 000 children per day. Through the therapeutic feeding centres of MSF, the presence of doctors enabled to reduce the mortality rate to 6% that year. Care is also provided through 40 mobile nutritional care centres which allow children to be treated closer to home. Many are treated at home with ready-to-use therapeutic food (RUTF) and come to the once a week for a check-up (focus on Niger, 2006). The concept of RUTF will be explained further later.

Due to weather conditions, an annual ‘ hunger’ gap exists between April and September when family food stocks run out and hundreds of thousands of children have little access to the nutrients they need for a healthy development (IAR 2007, 2008).

The World Health Organization recorded in the 43rd week of 2009 recorded 2253 cases of moderate malnutrition and 2938 cases of severe malnutrition and 5 deaths caused by malnutrition. On yearly bases for the year 2009, 157. 125 cases and 384 deaths were recorded between January 1st 2009 and October 25th 2009. 41% of those patients were diagnosed with severe malnutrition and 23% with moderate malnutrition (Bulletin hebdomadaire, 2009.)

The table in appendix 1 shows the distribution of the different malnutrition diagnoses on patients in the different regions in 2009, the graph on the other hand shows a comparison to the previous years 2006 to 2009. A general decrease is noticeable but sudden peaks and lows are present as well which

can be explained by the weather conditions. As in 2005, due to poor rains and severe locust outbreak, Niger registered a record grain deficit of more than 223. 000 tons (Niger, 2005).

Nutrition survey data and information in Niger are not compiled and analyzed well according the United States Agency of international development. Most nutrition surveys are conducted on ad hoc basis to meet the needs of varying agency objectives. Currently a joint survey by the Government, UNICEF and the centres for disease control has been conducted regionally. One of the goals of the program will therefore also be to encourage the constant recordkeeping of patients and updating the information.

Determinants:

Most important determinants program intends to influence:

In general, protein-energy malnutrition amongst weaning children depends on many aspects of which only a few are biological. The main determinant is that this occurrence is brought upon children in difficult socio-economic conditions, such as those in Niger. Most of these factors are related to poverty which may in turn reason dietary imbalances mainly through the incapability to provide a nutritionally balanced diet.

The following determinants are the main factors that play a role in this health issue:

Education:

The work status of the mother and her literacy rate are key in the cause of child malnutrition. If a mother had a good work status and a better

education, this would reduce the probability of the child to having a poor nutritional status. The low incomes, the lack of cultivation knowledge are what may cause an unbalanced diet. Therefore, improving a mother and future mother’s education will have a significant impact on their children’s nutrition.

Climate/Topology: Access to food: source to drinking water.

Niger’s hot, desert-dominated topology gives birth to few fruits, vegetables and legumes, and serves as grazing ground for a limited amount of livestock. Consequentially, the few grains and cereals yielded by Niger’s turf epitomize the rural diet. However, such produce provides only a miniscule percentage of the nutritional intake necessary, leading to varying levels of starvation and malnutrition.

Family Size/Second Child Syndrome.

In Niger, statistics show that 75% of girls married before the age of 18 and that 34% of them before 15. According to a source, it can be said that” some as young as ten”. Each woman has on average 7. 6 children and statistics further show that there is a 1-in-7 risk of dying during pregnancy or birth (Niger, 2010).

Measurable indicators that can verify whether a child is malnourished.

Before creating a program which proposes a health promotion plan to reduce protein-energy malnutrition amongst weaning children in Niger, it is important to look at the measurable points that can determine whether this malnutrition is the case or not.

According to the pharmaceutical company Merck (Morley, 2007); to determine the severity of protein-energy under nutrition it is important to look at the following points:

- Body mass Index.
- Plasma albumin.
- Total lymphocyte count.
- CD4+ count.
- Serum transferring.

In the table below, many of these points are mentioned and it can be determined whether the child has a normal, mild under nutrition, moderate under nutrition or severe under nutrition (Morley, 2007).

A diagnosis of whether a child has a under nutrition of protein-energy, may be based on the past eating habits of the child. Physical examinations, such as the ones in the table below aid in confirming this diagnosis:

The table above clearly shows which values one has to take into consideration when assessing the severity of protein-energy malnutrition.

Further research has shown that there are other ways to identify malnutrition in a child. This method, used by the UNICEF looks at ways to identify if a child of more than six months is acutely malnourished (Chamois, 2009). First, oedema (swelling) needs to be checked. This is checked by putting your thumb on each foot of the child for three seconds. If the print of your finger creates a shallow hole, then it can be said that the child has oedema. Secondly, the left arm circumference should be measured with a

specific kind of measuring device a bit like measuring tape. This left arm circumference can identify according to a colour code, whether the child is very malnourished, moderately malnourished or not malnourished. From both of these identifications, there are different solutions that should take place depending on the result.

Put oedema/left arm circumference picture.

Other tests, as written in the article Protein-Energy Malnutrition: Differential Diagnoses & Workup (Scheinfeld & Mokashi, 2010)may also include:

- Detailed dietary history.
- Growth measurements.
- A complete physical examination is indicated.
- Height-for-age or weight-for-height measurements.
- Skin biopsy and hair-pull analysis.

In order to narrow down our research for the program, the three main measurable factors will be:

- BMI.
- Height/weight ratio.
- Left arm circumference.

Other existing programs:

Until recently, malnutrition treatment has been restricted to facility-based approaches which are often miles away from rural communities and less than 40% of children with severe acute malnutrition (SAM) recover from hospital treatment. By the late 90’s, many researchers knew that RUTF’s

were key to meaningful SAM recovery rates. In 2000 clinical trials were conducted for RUTF's administered at home. In this study, a remarkable 80% of the treated children reached their 100% weight for height goal after 12 weeks.

Ready to Use Therapeutic Foods (RUTF) are high-calorie, fortified peanut butter-like pastes. Peanuts contain mono-unsaturated fats, which are easy to digest and are rich in zinc and protein: both good for the immune system and protein as well for muscle development (Therapeutic food, 2010). Peanuts are a good source of vitamin E and a powerful antioxidant that helps to convert food into energy. RUTF are also very high in calories which means that a child will get a lot of energy from just small amounts. This is very important because their stomachs have considerably shrunk.

A study by the American Medical Association published recently on January 21st 2009, proved the effect of preventive supplementation with Ready-To Use Therapeutic food on the nutritional status, mortality and morbidity of children aged 6 to 60 months. Six villages were randomly chosen for intervention and six to no intervention. The results showed significant changes in weight-for-height z-score according to the World Health Organization Child Growth Standards over the 8 month follow-up (appendix 3) (Isanaka; Nombela; Djibo etc., 2009).

Plumpy'nut, one of the examples of Ready-to-use therapeutic food is as effective as therapeutic milk products. The product does not require any additional water, cooking, refrigeration or other preparation and because there is no water in it, its conservation is relatively easy. The high energy,

high protein, peanut based paste fortified with mile and vitamins. Typically comes in foil wrappers or small plastic tubes which are practical for children to eat them. During the severe nutrition crisis in Niger in 2005, plumpy'nut helped saved thousands of lives. Since 2005, the Société de Transformation Alimentaire (STA) factory in Niamey has been producing the lifesaving food. It is the only plumpy'nut factory in West Africa and the production has grown about 40 tons per month. Last year only the product was used to treat more than 120. 000 severely malnourished children and 63. 000 moderately malnourished children, allowing them to return to a healthy weight in three to four weeks. The micro nutritional content of a plumpy'nut is described in appendix 2 (Dolan, n. d.). A standard plumpy'nut treatment goes for four weeks at a cost of 12 Euros.

Currently World Health Organization (WHO), World Food Program and UNICEF guidelines only recommend RUTF for severely malnourished children.

Running the combat against malnutrition in Niger since 2001 (Focus on Niger, 2006); Médecins Sans Frontières has been dispensing packets of plumpy'nuts in 22 centres in Niger since May 2005. The region in which Plumpy'nut was applied had the highest malnutrition rate in Niger. The region now has the lowest malnutrition rate in the country.

An article in Field Exchange magazine (Wilkinson & Isanaka, 2009), outlines the results of a study which addresses " one of the ongoing debates concerning the treatment of infants > 6m – which supplemental milk is the most appropriate to use in their treatment?" (Wilkinson & Isanaka, 2009). Unfortunately, infants of less than six months are not always treated for

malnutrition and cannot access to treatment programs until they reached six months of age.

Statistics show however, that in countries like Congo, Myanmar and Niger, more than 20% of all admissions to treatment protocols are of infants less than 6 months of age. As it is very important to consider infants of this age, the aim of the treatment taking place in this article was to encourage the production breast feeding. The study was to compare two different milk supplements with a sample size of 146 infants. Results showed that it is vital to identify malnourished infants as early as possible when they are 6 months or less as breastfeeding can significantly cause weight gain and a healthier life for the baby. The strength of this program is that it involves infants of a certain age that does not always have access to treatment programs.

An action plan has been researched and is currently still in process by an UN system called the standing committee on Nutrition (UN System Standing Commitee on Nutrition, 2006-2010). One of the goals of this action plan was to reduce the proportion of underweight young children by half from 28% in 1990 to 14% in 2015. In 2010 however, statistics show, that there are still 27% of children that are underweight.

The article states that “ hunger and malnutrition are caused by poverty and ignorance, and that they will improve if livelihoods (economic growth and incomes) and education services improve” (UN System Standing Commitee on Nutrition, 2006-2010). This action plan aims to establishing a global UN system where UN agencies, ministerial sectors and development actors to

find a consensus, a common vision and language on the causes of hunger and malnutrition.

This would be reached by wide communication and partnership building. The strength of this program is that a common interagency monitoring and evaluation strategy for food and nutrition programs should be achieved in a minimum of 20 countries in Africa, 20 countries in Asia and Latin America and in 10 other regions.

In another article named Nutrition: A foundation for development created by a worker at the UN, defines key elements that bring success to nutrition programs (Shrimpton, 2002). A growth chart, that was developed in the 1960's in Nigeria has influenced today's key element for a successful nutrition program. This key element is the use of an information system that shows people whether their nutrition situation is getting better or worse. Many malnourished children look normal to their parents as they get compared to other children of the district or community. The strength of this program is that by showing the parents and children what they really are supposed to look like at their size and age will bring awareness to their everyday lives.

Objectives:

This program is in accordance with the objectives and targets put out by the UN System Standing Committee on Nutrition in 2006, but on a local (rural area villages) level, rather than regional and country levels. The importance of inter-organizational relationships is emphasized to ensure that the

program is successful. Funding will be primarily from existing organizations in the conflict areas.

The Niger Food & Diet Pyramid, pictured below, is in coherence with a combination of Niger’s readily available resources and the specially formulated food and liquid supplements aims to provide a comprehensible guide to the whole population in an attempt to better educate the general population about nutritional needs. One serving size is conveniently defined as one handful, proportional to each individual’s size. Number of portions is indicated with a hand signalling the number in fingers; time of consumption is portrayed by the sun path ending with a moon.

The base of the pyramid is water, to be consumed at least seven times throughout the day, as portrayed by the complete sun path, primarily because of the extremely hot and dry climate and topography of the country. The second level is made up of grains, starches and legumes, such as millet, sorghum, cowpeas, potatoes and, in the better irrigated areas, rice. These are recommended to be consumed five times a day, also throughout the day. The reason this food group is not above fruits and vegetables like it is in most western countries is that they are much more available than the latter in Niger, as a direct result to the climate and topography, as well as the poor irrigation provided by Niger’s faultily placed rivers. The third tier up is made up of the vegetables found in the country: cassava – a root vegetable – corn, onions and cardoon – a leafy green vegetable. Also included in this section are dates, the indigenous fruit to the country, but only to be found in the wetter, oasis-type regions. Recommended intake is twice a day, once during the day and again in the evening. The fourth tier is shared with sugar,

peanuts and dairy (milk and butter). For the better part of the country, all of these items are hard to find, expensive and thus rarely consumed. Despite the scarcity, however, their nutritional value is essential to the human body at least once daily, and it is for this reason that, on this same tier, the food and liquid protein and calcium supplements such as Plumpy Nuts and ProSource, as well as calcium supplements like powdered milk are also pictured. The final tier is made up of meats, ultimately encompassing all available livestock, including cattle, sheep, goats, camels, donkeys, horses and poultry. The reason that no daily intake picture is present is that these animals are rare to find and are usually used for either for their milk/eggs or as a means of trade to access the other food groups. The goal is to have the pyramid posted at all médecins sans frontiers, UNICEF and WFP locations in Niger by the end of the current month.

The short-term objective is to eliminate mortality of weaning infants in Niger.

This program will be attempted by simultaneously training infants to breast feed and nursing poorly nourished mothers to health, for all mother-child patients that arrive at the existing MSF ambulatory and therapeutic feeding centers, in collaboration with UNICEF and WFP. On a case by case basis, this initiative should prove to be quite successful. If effectuated properly and supported by the local population, it should reduce infant mortality due to protein-energy, undernutrition-related causes significantly in its first year, and eradicate it completely by 2015.

The long-term objective is to ultimately end undernutrition in Niger by targeting future mothers, primarily through education adapted to illiterate women with visual aids and hands-on workshops.

This knowledge approach aims to provide a more comprehensive understanding of the human body and how to treat it. It would, in due course, allow the region to develop in a more healthy way, through a three workshop series on nutritional needs, sexual education and female empowerment to Niger's women, adapted for the 10-18 year old adolescent female population, to refocus from young adult and adult, post-malnutrition efforts, and go straight to the source. If the program is a success, family sizes should halve within 10 years, jointly reducing the number of undernutrition cases in the country. Additionally, this program thrives to initiate a woman's movement that would allow a healthy development of rural communities.

Strategies and activities:

Only through the intake of necessary proteins and a reduction of overall malnutrition in both mother-to-be and child will the vicious cycle of poverty as it presents itself in Niger be broken (The World Bank, 1997). Despite MSF's attempts at teaching Niger's women about the importance of breast milk to an infant – especially during the first 6 months of its life, allowing it to build up its immune system and avoid malnutrition all together – many mothers are in such poor health that they resort to water (OneWorld, August 2009).

Breast-feeding is not only fundamental for infant nutrition but also for reducing female fertility – as it suppresses the responsible hormone – and helps the post-birth uterus contraction, reducing future delivery complications (Figueroa, 2002).

The short-term program, in line with Michael Golden’s production line approach, will take place at the MSF ambulatory and therapeutic feeding centers already present in Niger and will be set up as follows (OneWorld, August 2009):

1. Dehydrated mother and infant enter the center.
2. Mother administered food and liquid to augment milk production.
3. Infant sucks on tube delivering milk formula attached to mother’s nipples, simultaneously teaching it to feed and stimulating milk production.
4. When mother is restored to health and quantity/quality of milk is adequate, mother and infant leave the center and mother continues breast feeding for a recommended period of five months, her health closely monitored.
5. Weekly check-ups and a continuous supply of necessary food and liquid are provided.

Essential to the development and sustainability of the state is the eviction of malnutrition among the population, especially concerning the younger generation. This long-term program focuses on providing the necessary steps to improve pre-pregnant adolescent girl’s nutritional status – thus allowing a future fetus to develop into a healthy human being – in addition to

a more concrete understanding of sex and female empowerment. It will be taught in a series of three workshops.

Michael Golden’s protocol, as demonstrated in his work in Ethiopia, appears to be aimed at the treatment of as many cases of malnutrition as quickly as possible. It is based on the efficiency of an industrial production line. Golden’s five steps to “ ridding the World of Malnutrition” (UNICEF, August 2003) can be described as an “ industrial revolution for the malnourished child”. It does not focus on long-term improvement of the situation and cycles provoking such malnourishment but it does allow for immediate results. Thus, other programs and organizations can step in on a more long-term basis to provide education and actual diet balance. This is where the distinction for this long-term program needs to be made as it will serve as a second step in rural areas that are already receiving food and malnutrition aid through other domains, whether it is from the short-term program provided by this organization, or that of another.

As much as education is essential to the elimination of malnutrition, food and sex are more important according to Maslow’s hierarchy of needs, see Figure below. The latter is situated at the bottom tier, namely “ Biological and Psychological Needs”, whereas the former is categorized under “ Cognitive Needs”, four tiers up. A balanced diet does not particularly concern a human being without food; he or she would rather just have food to begin with. Once they are less hungry, and have regained a bit of hope, they can be sat down and talked through the Niger-adapted food pyramid that has been constructed solely with pictures to provide a complete, visual outlook of what proper nutrition requires.

Sexual education in Niger will pose as another difficult challenge, especially when the focus is on individuals in rural areas. Not only are the vast majority of women illiterate, but approximately 90% (Buckens, 2009) of the country's population is Muslim. Hence, a visual method needs to be used to teach sexual education without offending the local population. Firstly, medical professionals, either doctors or nurses, will always be responsible for providing the classes. Studies have shown that they are among the most trusted and that their presence would allow a bit more flexibility in what can and cannot be shown. Secondly, visual aids must be clearly understood without having to provide graphic sexual images. The program needs to refrain from comparing human sex to reproduction in animals as this may also pose as an offence. Thirdly, the program will be segregated for men and women, to allow a more comfortable, gender-specific approach. No woman will be forced to participate; however, they will be given the incentive to, as complimentary food and liquid nutritional supplements will be part of its foundation.

Partnership development:

In order to achieve or short term and long term objectives to reduce protein-energy malnutrition amongst weaning children in Niger, one has to consider the development of a partnership to maintain positive results. As nutritionists working for Médecins sans Frontières, our goal with this program is to continue generating positive outcomes.

Many international organizations such as UNICEF, UN agencies, World Food programme, together with MSF have been collaborating closely with the government of Niger and non-governmental partners on the ground. The

existence and execution of the proposed program cannot be realized without the cooperation of different organizations and thus only excellent relationship between them can guaranty the success of the program.

Therapeutic feeding centres in Niger provide nutritional and medical treatment for children between the age of six months and five years suffering from severe malnutrition. The five feeding centres in Niger are in Maradi, Dakoro, Keita, Tahoua and Aguie (MSF'S response, 2005).

In July 2005, international aid agencies prepared to distribute supplementary food rations at the therapeutic feeding centre in Maradi. Fearing that nobody would show up, the aid workers spread the word in the nearby villages. The modicum of mobilization led to a near riot as hundreds of women crowded in desperate to obtain food (Tectonidis, 2006). Such a scene points out to which extent the problem of malnutrition is present amongst the population. During the crisis year 2005, when nutritional emergency was caused by drought and an infestation of locust in the previous year, malnourished children began pouring into the therapeutic feeding of MSF.

Until then, malnourished children were routinely hospitalized in therapeutic feeding centres but because of the substantial resources required, it has been impossible to open sufficient number of beds during emergency periods (the yearly hunger gaps)(Tectodinis, 2006). Today with the presence of ready-to-use therapeutic food such as Plumpy'nut, more severe cases can be accepted at the centre while the moderate cases will be send home with solid therapeutic food and will come back weekly for check-up but without having to be hospitalized. Most children treated in a stabilization unit do

survive but are soon discharged to an outpatient program (Tectodinis, 2006). The TFC's will also help teach parents about proper nutrition until they gain respite from poverty (Bamford, 2008).

In a study comparing therapeutic feeding centres and ambulatory care centres by the department of Health services at the University of Washington, the authors concluded the ambulatory rehabilitation to be more cost-effective (Chapko, Prual, Gamatié etc; 1994).

Médecins sans frontiers.

MSF is an international humanitarian aid organisation which has been setting up emergency medical aid mission to populations in danger in more than 70 countries around the word since 1971. Where health structures are insufficient, MSF collaborates with other organizations and local authorities. MSF works in rehabilitation of hospitals, dispensaries, vaccination programmes and water and sanitation projects. MSF seeks also to raise awareness of crisis situations and to address any violations of basic human rights (about MSF, 2005).

In 2005, Niger represents one of the largest malnutrition-treatment programs in Médecins sans frontiers history: a capacity of treating 20. 000 severely nourished children per year, five therapeutic feeding centres and 25 ambulatory centres, representing a budget of around €10 million.

UNICEF:

" Unicef, the united nations children's fund, is the driving force that helps build a world where the rights of every child are realized". UNICEF, present in

190 countries, believes that nurturing and caring for children are the cornerstones of human progress and was created to overcome obstacles of poverty, violence, disease and discrimination on a child’s path. Upholding the Convention on the Rights of the child and as part of the Global Movement for Children, UNICEF strives for peace and security and work to hold everyone accountable to promises made for children (who we are, 2008).

UNICEF Niger is assisting most