A Review of Health and Nutrition in Prisons: A Challenge Between Human Rights Conventions, Nutrition Guidelines and Health Policies

Yasmine Fakhry

Abstract

This paper seeks to provide a scoping review of international conventions and policies tackling health and nutrition from a human rights angle as well as studies assessing health security, nutrition status and adequacy of diet in prisons through a selective bibliography from several countries representing different economical statuses, ethnicities, cultures, judiciary structures, and health systems. The review highlights the influence of social factors in prisons with regards to food security, fulfilment of basic nutrition and health rights, weight status in prison, quality of diet, and medical nourishment therapy. The review concludes that women and children in prisons often suffer from inadequate nutrition and health services. In comparison between countries, under-developed countries seem to offer poor health and nutrition services in prisons. Further research should be undertaken, especially in the geographical areas that were not covered in available literature, such as the Middle Eastern and North African regions, to establish whether human rights standards and international policies pertaining to health and nutrition are applied in prisons in these regions. It would also be interesting to develop a complete and reliable verified tool designed to assess individuals in detention while taking into consideration human rights, social, nutrition, and health determinants.

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Abbreviations

AI: Adequate Intake

BF: Breastfeeding, Breastfed, Breastfeed

BMI: Body Mass Index

FAO: Food and Agriculture Organization

HIV: Human Immunodeficiency Virus

ICRC: International Committee of the Red Cross

MENA: Middle East and North Africa

MBU: Mother Baby Unit

NCDs: Non-Communicable Diseases

OB: Obesity, Obese

OHCHR: The Office of the United Nations High Commissioner for Human Rights

OW: Overweight

RDA: Recommended Dietary Allowance

SDG: Sustainable Development Goals

SSA: Sub-Saharan Africa

TB: Tuberculosis

UL: Upper Limit

UN: United Nations

USA: United States of America

WHO: World Health Organization

Introduction

Prison is a crucial landmark that should be prioritised within the public health agenda. Accordingly, health promotion and reduction of health inequalities should be interrelated between communities and prisons in order to maintain a good welfare over the life course. Prisoners, similar to the rest of the general population, are entitled to have access to their rights to health, fulfilled through a solid healthcare system reflective of the national well-being system that aims to ´leave no one behind´ as articulated by the United Nations in general and the World Health Organization (WHO) specifically, in order to help countries, achieve universal health coverage and the sustainable development goals (SDGs) by 2030 (WHO, 2019).

Right to health is the most basic, essential, and equal right for all human beings, and it was explicitly written in the universal declaration of Human Rights under article 25 as the right for a standard of living suitable for good health and wellbeing (United Nations (UN), 1948). This right encompasses the right to access health determinants such as safe water and food, safe housing, healthy working environment and health education, a system of health protection, and freedom as regards non-consensual medical treatments. Indeed, this right must be insured without discrimination to all, regardless of age, gender, social status, religion, politics, economic status, and disabilities, with special focus on disadvantaged, less fortunate populations (WHO and Office of the United Nations High Commissioner for Human Rights (OHCHR), 2008). In relation to what is mentioned above, appropriate food and nutrition are among basic determinants of fulfilment of right to health and can subsequently prevent malnutrition.

As declared by WHO, malnutrition is a primary concern to Global Public Health contributing to a series of diseases including undernourishment, over-nutrition, and inadequate vitamins and minerals intake. Malnutrition has a double burden on populations and individuals characterised

by the coexistence of undernutrition along with overweight (OW), obesity (OB), or non-communicable diseases (NCD) related to diet (WHO, 2017). In 2014, approximately half a billion of adults worldwide were underweight, while 1.9 billion were either OW or OB (Di Cesare et al., 2016). The United Nations addressed malnutrition in its 'UN Decade of Action on Nutrition' to commit to 10 years of serious and coherent implementation of policies, strategies, and more investments aiming to eliminate malnutrition worldwide. This is meant to be achieved through social protection and nutrition-related education, food systems aligned with health systems, improved trade and investment, safe and supportive environments, and through promoting nutrition governance and accountability (WHO & Food and Agriculture Organization (FAO), 2018). When it comes to the SDGs, there was no explicit mention of disease-related malnutrition, yet five out of seventeen goals would be easily endorsed in the context of malnutrition (UN, 2015). In the context of health, disadvantaged populations are women, children and adolescents, persons with disabilities, immigrants, and persons with HIV/AIDS (WHO and OHCHR, 2008). Interestingly enough, the special rapporteur on the right to health received complaints about violations in determinants of right to health for prisoners: absence of access to healthcare, forced feeding, and lack of goods and services (WHO and OHCHR, 2008). Consequently, prisoners are yet another group to be added to the list of disadvantaged people in terms of access to health services.

Prisoners are typically individuals who are put in prison, deprived of their liberty as being suspected or found to have committed a crime. Some prisoners are sentenced for months, years or even for life, while others are convicted until trial.

As reported by Walmsley in 2018, more than eleven million individuals worldwide are imprisoned either as suspected (pre-trial) or to serve a sentence. The prison population is continuing to grow disproportionately in comparison to the world population. Prisoners are normally predisposed to develop undesirable health issues due to their background, attitude in prison along with the prevailing atmosphere of the detention and penal facilities (International Committee of the Red Cross (ICRC), 2021). In particular, malnutrition is very common in prisons and is a major risk factor for mortality and morbidity in both developed and underdeveloped countries (Davison et al., 2019).

The objective of this paper is to review the knowledge currently available in literature about nutrition status, diet adequacy, and health security in the context of prisons with a focus on their impact on the human and social perspectives, through studies and international policies and conventions.

Methodology

A scoping review sorted what is currently known and what lies as a gap in the literature about nutrition status, diet, food security, and related nutritional and health services of prisoners around the world, presenting a diversity of findings from different countries, cultures, and races. The search strategy was designed to retrieve articles published between 1948 and 2020 in the Google Scholar engine and ResearchGate network by combining the terms 'nutrition' OR 'diet' OR 'food' OR 'health' AND 'prisoner' OR 'prison' OR 'inmate' OR 'imprisonment' OR 'incarceration'.

Selected studies include reviews and population-based studies using any methodology of assessment of prisoners for the following parameters: body weight, weight change, diet quantity and/or quality, blood tests related to nutritional status, physical activity, solitary confinement, health, and occupancy in cells. Other studies found relevant and related to the topic of interest were also added to the database for review. The inclusion criteria were the following: current prisoners at the time of project, males and females (including pregnant and lactating), coming from all nationalities, religions, races, and countries (both developed and underdeveloped), as well as studies published up to year 2020. Exclusion criteria were the following: studies published in a language other than English addressing juvenile prisoners and prisoners hospitalised at the time of the project.

The search also collected and reviewed grey literature from 1948 until 2021. Grey literature was collected through official websites of international organisations, mainly the UN agencies and the ICRC as well as official governmental websites. Accordingly, I obtained 54 publications of research studies, international standards, conventions, and guides, which were all sorted and analysed.

International conventions addressing human rights and health equity in prisons

First,International Humanitarian Law, which consists of a series of humanitarian rules and frameworks, governs the humanitarian treatment and protection of individuals not taking part during an armed conflict including civilians, medical personnel, and religious military along with prisoners of war (ICRC, 1949). Additionally, several international human rights treaties exist to manage the treatment of individuals during peace time, including prisoners. As per Nelson Mandela's rules 22 and 23 related to food and exercise, prisoners should have access to well-handled and served food with good nutritional content, and water should be available whenever needed. Besides, every prisoner has the right to a minimum of one hour of exercise (UN, 1955). Also, the prison should ensure a good supply of food adhering to minimum standards for prisoners to prepare and eat in manners that are culturally and traditionally meaningful and respectful. According to the ICRC (2020), the involvement of inmates in fresh food production is a very meaningful integration-oriented activity for them.

The UN general assembly, under the Declaration of Human Rights, issued the right to food for everyone under article 25. Also, under the 'Elimination of all Forms of Racial Discrimination', the UN gave the right to public health and medical care under article 5, including inmates (UN, 1965).

All detainees, including those who come from a community lacking some basic needs, should be supplied with water, food, sanitary toilet facilities, and health care. Fortunately, prisons can finally contribute to the attainment of social justice in terms of health when prisoners would, and for the first time, have access to adequate nutrition, good health, and non-social failure (Enggist et al., 2014). Cardenas et al. (2019) also have a similar opinion that prisons can finally contribute to social justice in terms of health because admission of many prisoners would be a first time in life opportunity to get exposed to adequate nutrition, good health, and non-social failure.

Consequently, norms, which encompasses respect and protection of human rights, lie at the centre of health issues with public health programs and policies (Enggist et al., 2014; Cardenas et al., 2019).

In regards with the right to health, it is the responsibility of states to assure fulfilment of this right, regardless of the financial situation or the limited availability of resources. Indeed, the right to health must be assured without discrimination to everyone, regardless of age, gender, social status, religion, politics, economic status, and disabilities, with special focus on disadvantaged populations(WHO and OHCHR, 2008).

The SDGs developed by the UN in 2015 support our issue of interest: SDG 2 Zero Hunger, SDG 5 Gender Equality, and SDG 10 Reduced Inequalities can be directly applied in the context of not leaving anyone behind, even in prison. No detainee should experience hunger and all detainees should be treated equally regardless of gender, race, religion, social class, nationality, panel status, and educational level when it comes to access to nutrition and health services (UN, 2015).

On the other hand, SDG 3 Good Health and Well-Being For People and SDG 6 Clean Water and Sanitation are both basic needs and necessities to fulfil the right to health for any person, including prisoners (UN, 2015).

In reality, being deprived of this liberty would most likely worsen the physical and mental health due to increased stress, anxiety, and limited access to exercise. Typically, prisoners have the right to maintain a good physical and mental health and, in addition, to enjoy an environment that does not worsen their pre-prison health status and that minimises health risks. Indeed this is a must, even in tough economic statuses (Coyle, 2003).

Nutritional care is also one of the essential needs of a prisoner: it is a human right by itself just like the right to health or food that holds human dignity and ethical principles. Good nutritional care is fulfilling a patient's right to benefit from malnutrition screening and malnutrition diagnosis, receive regular hospital diets, therapeutic diet and medical nutrition therapy where it should be delivered by health experts and guaranteed by governmental authorities (Cardenas et al., 2019).

As an integral part of the health of the prisoners, medical nutrition therapy improves wellbeing for those who are usually in poor physical, mental and social health (Davison et al., 2019).

The majority of prisoners are usually the most socially disadvantaged or the poorest in society, and thus are the most likely to have the greatest health needs.

Prisoners with NCDs such as diabetes mellitus, kidney failure, hypertension, cardiovascular diseases, respiratory diseases, anorexia, OB, and cancer should be at the top priority for nutritional care. In addition to that, prisoners with acquired immunodeficiency syndrome (AIDS) and tuberculosis (TB) should also be given attention for nutritional care. On the other hand, special nutrition should be taken into consideration in lifecycle for people such as pregnant, lactating women and children living with their mothers in prison.

In general, besides having low level of physical health, prisoners also have lower levels of mental health than the general population (De Viggiani, 2007).

It is well known that prison conditions such as overcrowding, exposure to illicit drugs and violence, separation from family, emotional deprivation, and absence of purposeful activity, all lead to health problems. In addition to that, violence, bullying, and intimidation are very common in prisons, which makes it a daily challenge and struggle for inmates. In reality, imprisonment brings a double punishment: not only depriving prisoners of liberty but also depriving them psychologically in a significant way (De Viggiani, 2007).

LaMonaca et al (2018) point out that in rich-resource countries, prisons are perceived as an opportunity to provide medical services to vulnerable populations suffering from drug use and diseases. Whereas in low-income countries, prisons lack basic needs and consequently have inadequate access to medical and nutritional services.

Overall, several trusted international policies, conventions and studies explicitly proclaimed prisoners' right to receive adequate health necessities, food and water and to take advantage of family visits regardless of their gender, background, culture, ethnicity, etc. Prisoners also have the right to access proper nutrition and medical services in order to either manage their own disease or to maintain a good health and mental status.

Obesity, underweight, weight and NCDs change in prisons

In a systematic review addressing the prevalence of NCD in prisons worldwide, findings suggested that male prisoners were less likely to be OB than male non-prisoners, whereas females in prisons were more likely to be OB as compared with non-imprisoned women in the United States of America (USA) and Australia (Herbert et al., 2012). Another systematic review of studies examining weight change during incarceration in developed countries, specifically in the USA, Australia, France, England, and Japan was reported by Gerbremariam et al. (2018); it showed increase of weight, mainly due to smoking cessation and prolonged incarceration period.

Nara and Igarashi (1998) conducted a study in Japan, which revealed a weight loss mainly as a consequence of calorie restriction, obligatory work, and half an hour of daily physical activity. In Mexico, a study on two large scale male prisons showed minor decrease in body mass index (BMI) and waist circumference, especially during the initial period after admission and among prisoners who get imprisoned at younger ages (Silverman-Retana et al., 2015). In another part of South America, several studies have been carried out. Studies in Haiti found that 17% of prison population is underweight while in Chile, 74.5% of the inmates noticed weight fluctuations since they had entered the correctional facility: 55.2% had gained weight and 44.8 % had lost weight (LaMonaca et al., 2018; Osses-Paredes and Riquelme-Pereira, 2013).

Abera and Adane (2017) investigated the prevalence of underweight in nine major prisons in Ethiopia: 25.2% of prisoners reported to be underweight with some prisons reaching 53.7% prevalence of underweight. Being underweight was prevalent when there was a notable lack of family support, and among those who have a poor appetite or respiratory problems, those who were incarcerated for less than 18 months, those who were previously imprisoned, or those with positive human immunodeficiency virus (HIV) or TB. In Libya, 8% of prisoners were underweight whereas 26.5% were OW or OB (Annour et al., 2015).

These results suggest that prisoners, pre-dominantly male, tend to lose weight in prison, whereas females tend to gain weight. Interestingly, underweight is relatively prevalent in prisons of Africa and South America.

Women in prisons

When it comes to gender equity, a convention was issued to eliminate discrimination against women and calling for gender equity in all contexts, including public health and nutrition. Thus women, on equality basis with men, under article 12 of Convention on the Elimination of All Forms of Discrimination against Women, should receive appropriate healthcare services along with proper nutrition during pregnancy and lactation. Women also, under article 14, should have adequate living conditions including sanitation and water supply (UN, 1979). This convention should have a direct application on women in prisons.

Globally, half a million of females are imprisoned either as sentenced or convicted. Yet, it is very important to bear in mind that females have special health needs related to gender sensitivity, which are often unmet in the prison context (Van Hout and Mhlanga-Gunda, 2018).

Women, due to their reproductive ability, have special circumstantial nutritional and health 'milestones', like menstruation, pregnancy, and lactation. These 'gender related circumstances' should be addressed even in prisons.

In 2019, Ranaut et al. published a paper in which they state that pregnant and lactating women should not be detained unless strong justification exists (Ranaut and Babbar, 2019). The majority of imprisoned women should not be placed in jail due to many factors. Some women are charged with minor and non-offensive crimes that do not bring a risk to the general population. Some others are detained due to their poor financial status, leading to the inability to pay fines. Moreover, some women are victims themselves, yet they are imprisoned because of discriminatory rules and policies (UNODC, 2014).

In the USA, around 4% of female prisoners are pregnant at the time of admission, versus a mere 7% in England, and 100 childbirths happening per year (Abbott et al., 2020; Abbott and Scott, 2017). Women, as pregnant inmates, are expected to have special treatment compared to other non-pregnant inmates. Unfortunately, those underprivileged minorities suffer from a sensation of fear, a threatening fear for the safety of their baby, a lack of healthy snacks and convenient bedding, a lack of support during sickness, and absence of supportive relationships from both the staff and the other prisoners (Abbott et al., 2020).

Clearly, pregnant prisoners face challenging health and nutrition issues. In an investigation into the nutrition of pregnant women in prisons, Shlafer et al (2017) found that they have little control over food offered, their diet is way below the daily recommended intake, and thus fail to meet the optimal nutritional needs. Pregnant women's needs can be easily met with a diet rich in fruits, vegetables and whole grains. According to Todrys and Amon (2011), women feel that they do not have protection nor a special treatment for their expectant status. They feel disempowered with the lack of control on their pregnancy and childbirth plan, and they develop fear especially towards the safety of their child.

In sub-Saharan Africa (SSA), women make 1-4% of the total prison population. For the interest of my research, the prison environment is characterised by food insecurity and poor healthcare

services. This poor environment facilitates the spread of HIV and TB across the SSA's prisons. So far, however, there has been little discussion about the nutrition of women in SSA, as studies covered only 18 out of the 49 countries making this African area (Van Hout and Mhlanga-Gunda, 2018).

A scoping review was published about the health situation in women's prisons in SSA. Results from most of the studies on the different countries showed that prisons were callous and overcrowded with poor ventilation and sanitation (Van Hout and Mhlanga-Gunda, 2018). When it comes to nutrition, the daily provision of food is poor and inadequate especially for pregnant and lactating women, or those with young children. In the same study, 15 SSA countries reported poor health services for female prisoners such as regular medical check-ups, provision of medications, and gynaecological care. Besides, in Ghana and Zambia, females were disadvantaged compared to male prisoners in receiving medical treatment (Van Hout and Mhlanga-Gunda, 2018). Todrys and Amon (2011) concluded in a study conducted in four prisons in Zambia that pregnant women do not receive prenatal care, including those who are HIV positive, and do not even receive any special nutrition.

Mothers and their infants make up a solid biological unit, in a way that their nutrition and health are inseparable as well. When it comes to breastfeeding (BF), pregnant women in prisons are less capable of choosing whether they want to BF due to the rigid system within the prison. As recommended by WHO, BF is the exclusive optimal source of nutrition for infants for the first six months and should be maintained for two years, and complementary feeding should be initiated at six months (WHO, 2002).

In the United Kingdom, 50% of female prisoners secure a place within the mother-baby unit (MBU) which makes them able to keep the baby with them regardless of BF choice. Challenges facing breastfeeding in prisons are the following: little privacy as prison officers are often men, expected separation from baby, limited equipment (pump, ice packs, etc.), and emotional suffering in case of separation from their babies. Unfortunately, some women prisoners breastfeed their infant only during weekly visits (Abbott and Scott, 2017).

In Pakistan, Anwar and Shah (2017) assessed the quality of diet for women prisoners serving in the Pashwar Central Jail. Prisoners received enough energy and protein. Yet protein came only from vegetarian sources, which is a low-quality protein. When it comes to vitamin and mineral content, the diet fails to meet the needs adequately.

Furthermore, a study carried out in Antanimora prison in Madagascar (Ravaoarisoa et al, 2019) concluded that 28% of female prisoners (out of which 5% were either pregnant or lactating) were undernourished due to the following factors: receiving two meals per day instead of three, insufficient calorie intake, prolonged detention period, insufficient relatives' visits, and lack of financial support from the family.

In brief, women are often marginalised in the health and nutrition setting of the prison due to discrimination and gender inequity. Clearly, higher risk in this inequity is prevalent for pregnant and breastfeeding women. Therefore, women should only be detained in critical criminal situations and should be imprisoned in circumstances matching their gender specific healthcare requirements such as menstruation, pregnancy, or lactation, without any risk of sexual harassment or gender-based violence. As for the women who must deliver while in detention, there should be a protective environment to support growth and development for

infants and children by ensuring provision of specific needs like diapers, milk formula, baby food, etc.

Children accompanying their mothers in prisons

Malnutrition is the main cause in one way or another of more than half of the deaths in children under five years as declared by WHO. Children in prison go through difficult circumstances that require specialised support, specifically in terms of health and nutrition; and failure to meet the required support might lead to malnutrition and growth issues.

In fact, the nutritional status of children under five years is highly dependent on social, demographic, health, and feeding practices. For children staying with their mothers in prisons, some institutions have special MBUs with special facilities while in other institutions, children stay with their mothers under regular conditions without provision of special support for the children. A study was carried out by ElDin et al. (2018) to analyse the effect of nutrition intervention on children living with their inmate mothers, whereby a series of sessions were conducted to increase knowledge of mothers about infant feeding with some hands-on practices regarding BF positions, bottle feeding, and safe preparation of complementary feeding. After this intervention, mothers showed better performance in feeding their children and also anthropometrical measures, particularly Weight, Height, BMI, and mid upper arm circumference of children improved.

As reported in the study conducted in Zambia by Todrys and Amon (2011), children and mothers were not accommodated in special cells and are neither given special food nor infant formula (for those who do not BF). Also, mothers had to share parts of their portions in order to feed their children. Fortunately, in South Africa, Ethiopia, Kenya, and Nambia, prison administrations provided additional food for breastfeeding women and their children (Van Hout and Mhlanga-Gunda, 2019)

In summary, children living in prison with their mothers are predominantly at high risk of malnutrition and problems with growth, and thus special attention should be given to their nutrition.

Food security in prisons: quantity and quality

ICRC (2020) states that food of acceptable quality adapted to ethnicities and habits of detainees should be well prepared and served at usual mealtimes. In fact, prison facilities that are not well designed might produce food at unacceptable food temperature, which puts the detainees at risk of suffering from malnutrition or becoming sick. Interestingly enough, prisoners do not rely only on food from the kitchen of self-catered prisons; they can obtain food from visitors, prisons canteens or shops, produce gardens on prison campus, and informally prepare meals within accommodation units, or a combination of any of the above (Smoyer and Minke, 2015). Also, food trading and begging for food are very common in prison environments (Topp et al., 2016).

While examining the quality and quantity of diet among many studies around the world, I can note that the diet is generally inadequate, with some exceptions. In Mexican prisons, a study

by Silverman-Retana et al. (2015) concluded that there is no special consideration for dietary requirements. Nutrition is provided from family members food and from prison food prepared by prisoners. Cooking and portion control are prisoners' tasks, although prison administration provides raw material and menus. In Iran, a study by KhodaBakhshiFard et al (2014) found that the prison food menu supplied inadequate energy intake with deficiency of protein, absence of fruits, and excessive supply of grains. In Australia, a research study was conducted in a male prison to examine food practices. Food is provided through a 4-week nonselective cyclical menu prepared by prisoners and food sharing practices are widely common among prisoners. In terms of diet quality, the menu was adequate and met the recommended dietary allowance (RDA) and adequate intake (AI) for adult males of all ages, except for Sodium which exceeded upper limit (UL) and Vitamin D, Calcium, and Omega 6 long chain Fatty Acids were of low consumption (Hannan-Jones and Capra, 2016). In England, a study conducted by Edwards et al. (2007) covered eight prisons for males, females, and juveniles, and concluded that in general prisoners have access to a nutritious diet represented by different menus matching the heterogenous population of prisoners: a standard, healthy, vegan, vegetarian, and Halal menus are all available. A nutrient analysis concluded that there are minor deficiencies of Zinc, Manganese, Vitamin D, Vitamin E, Selenium, Iodine, and Vitamin B12, and excessive intake of Sodium (salt) in certain menus of certain prisons.

In Australia, Herbert et al. (2012) examined energy and Sodium intake in prisons through a systematic review and concluded that females exceeded the recommended levels by two to three times. In comparison with the Australian general population, prisoners received more energy and macronutrients. In Pakistan, 98% of prisoners are unsatisfied with the quality of food, and, when considering the common complaint that meals were undercooked, the percentage rose to 99.5. The source of food is either from within the prison, homemade, or a combination of both (Qadir et al., 2014).

A study discussing diet in prisons in Bangladesh revealed that the daily menu supplies around 1400 Kcal which is definitely low, with sufficient supply of carbohydrates and vegetables, lack of fruits and milk sources, and low intake of meat (Rahman et al, 2017). In Zambia, the food has very low levels of protein (which comes only from Kapenta) and is short of vegetables. Unfortunately, HIV patients reported that meal timing is not synchronised with medications schedules, which threatens the drug-nutrient status (Topp et al., 2016).

In Papua New Guinea, Gould et al. (2013) discussed that the source of food is either prison food and/or some homemade food brought by family members who visit during the weekend. In terms of diet, fruits and vegetables were rarely, if not ever, consumed by prisoners. Average calorie intake is 1776 Kcal per day for prisoners which is quite close to WHO's recommendations of 1820 Kcal per day. In Haiti, when compared with the general population, 53% of the prison population have lower than the minimum level of dietary and energy consumption. Interestingly, this study correlated reported visitors with BMI levels. It showed that prisoners who had an increased number of visitors were less likely to be underweight (LaMonaca et al., 2018).

In a small study by Topp et al. (2016) in Zambia covering a random sample of male inmates, 96% of prisoners find either the quantity or quality of food provided inadequate. Some prison facilities do not provide dinner meals while others offer it uncooked, which requires prisoners to cook it or consume it uncooked. Within the same country, some prison facilities receive

supper early at lunch time, which requires inmates to keep it unrefrigerated until supper time due to the absence of refrigerators, which poses a risk for food safety (Topp et al., 2016).

LaMonaca et al. (2018) examined perception of food security in prisons in Haiti. Regarding food security questions to prisoners, 94% chose 'I have less to eat than I did before I was brought to prison' from the food insecurity scale, 77% chose 'I often go to bed feeling hungry', and 22% chose 'I get enough food from the prison alone to feel satisfied'.

In summary, prisons in developed countries such as England and Australia better served the inmates in terms of energy, nutrients, and number of meals supply. In underdeveloped countries such as Haiti, Bangladesh, Papua Guinea, and Zambia, inmates suffered from a low source of energy, two meals per day and food lacking some basic food groups - mainly proteins and fruits.

Blood tests reflecting nutrition and health status in prison

A biochemical assessment refers to testing blood, urine, and stools. It is one of the tools used in nutritional assessment. Particularly, laboratory tests are used for medical diagnosis to support a nutrition diagnosis and to evaluate the effectiveness of a treatment or a medical nutrition therapy (Mahan and Raymond, 2017).

In New Papua Guinea, a study by Gould et al. (2013) analysed blood tests related to the nutrition of prisoners and guards. Half of the prisoners had blood tests results below normal for Retinol, Vitamin C, Zinc and Folate. It is important to note that prisoners who served 18 months or less of detention had higher levels of Folate compared to those who served a longer period of detention. Alpha Tocopherol, Thiamin, B12, and Selenium were within normal range for both the prisoners and the guards. For Vitamin D levels, results in prisoners' population seemed to be low in comparison to the rest of the population (Gould et al., 2013).

An American study by Nwosu et al. (2014) examining Vitamin D deficiency in Massachusetts prisons concluded the following: 31% of prisoners were Vitamin D sufficient, whereas 33% were deficient, and mainly 34% insufficient. Moreover, prisoners of a Black race were more likely to be at risk than those of a white race.

In Kenya, a study was conducted to address Vitamin A deficiency in a male prison: 25% had Vitamin A deficiency disorders mainly caused by a deficiency in the diet provided in prison which is low in carotenoids and animal sources of retinol (Mathenge et al., 2007).

These results suggest that minor deficiencies in micronutrients related to quality of diet were noted in prisons. Yet, Vitamin D deficiency seemed to be consistent throughout two studies mainly because of the limited outdoor access.

Health security in prisons

Health security is ensuring the same standards of health care that are available in the community and providing access to the necessary health-care services for prisoners, free of charge and without discrimination.

Many criteria play the role of health determinants of prisons as per ICRC (2018). The determinants are the following: quantity and quality of water available for prisoners, quality and quantity of diet, ventilation and occupancy, personal and general hygiene, outdoor access in terms of frequency and duration of exercise, recreational activities, etc. (ICRC, 2018). As a matter of fact, occupancy sounds to be the most important determinant while assessing healthcare system in a prison. According to ICRC, the official capacity describes how many people a prison is able to accommodate according to its architecture and infrastructure, while properly addressing the basic needs of providing water, sanitation, lighting, ventilation, healthcare services, etc. When the prison is at full capacity, the occupancy rate is 100% where it is expected that all prisoners have their essential needs fulfilled. On the other hand, overcrowding and overpopulation are two terms that are used interchangeably to describe the situation where the occupancy rate exceeds 150%, which presents a threat due to overuse and increased competition for resources, leading to violence, malnutrition, insufficient water supply, infections, etc. Accordingly, overcrowding leads to physical and mental health problems (ICRC, 2021).

In Bangladesh, as reported by Rahman et al. (2017), 88% of prisoners have a light physical activity level and most of the prisoners sleep for five to six or six to seven hours. In Pakistan, 9% of prisoners regularly go to the prison's gym (Qadir et al., 2014). In a brief study in Zambia comparing a random sample of male prisoners with prison staff (officers, healthcare workers, and policy makers), anxiety related to health nutrition and sanitation was reported by both groups (Topp et al., 2016). Also, in Zambia a study by Todrys and Amon (2011)reported over 300% occupancy in prisons where healthy and sick inmates live all together and four women sleep on the same mattress in unventilated cells. In Haiti, occupancy in prisons is 400% and 87% of prisoners rate their health to be somewhere between poor and fair (LaMonaca et al., 2018).

In the study conducted in Bangladesh, prisons were reported to be overloaded with an occupancy rate of 350% (Rahman et al, 2017). In Chile, Osses-Paredes and Riquelme-Pereira (2013) drew the attention to the health status in prisons. Considering an assessment scale ranged between zero and 10, with zero being the worst health status and 10 being the best perceived health status, there was a slight difference in the perception of the inmates' current health status (average 7.07) versus the perception they had prior to their incarceration (average 6.69). The current perception of health status weighted better and presented more pronounced fluctuations than the previous health conditions. The majority of inmates rarely pursued medical assistance (56 %) and 15.6 % did so with some frequency. On the other hand, 13.5 % of inmates had never requested healthcare while in prison. Only 12.8 % and 3% had requested medical care on a regular basis and whenever they needed it, respectively (Osses-Paredes and Riquelme-Pereira, 2013).

In short, often in underdeveloped countries, inmates suffer from insecurities related to their health with concrete evidence of overpopulation and lack of space, worsening of health status in prison, and inadequate access to health services as often as needed. However, these results are expected from the perspective of health economics as the weight of health economy is highly proportional to the overall economy of the country.

Solitary confinement from a health perspective

Solitary confinement is a common type of imprisonment applied worldwide usually on 'difficult to manage prisoners' as a way of temporary punishment that entitles the prisoner to be in physical and social isolation in a single cell for 22.5 to 24 hours per day (Charleroy and Marland, 2016). Typically, solitary cells differ from regular cells characterised by a reasonable size, sunlight, windows, a toilet, and a shower to protect the privacy of the prisoner. In fact solitary cells are small in size, lack windows and urinal, where a prisoner would use a bucket for toilet use instead (WHO, 2014). Apart from punishment, solitary confinement has the following uses: protection of vulnerable prisoners, prison management, national security, pre-charge, pre-trial investigation, and lack of other institutional solutions (Shalev, 2008). However, solitary confinement deteriorates the status of both mentally ill prisoners and mentally healthy prisoners. It induces panic, hallucinations, depression, poor concentration, poor memory, disorientation, self-harm, and sometimes even suicide. Remarkably, solitary confinement does not only impact mental health, it also affects the physical health of the prisoner on many levels: insomnia, lethargy, severe fatigue, gastrointestinal problems, genitourinary problems, migraines, poor appetite, weight loss, and worsening of pre-existing medical problems (Charleroy and Marland, 2016; WHO, 2014). Yet Shalev states that when this confinement is applied for less than 10 days, minimal negative health effects are observed (Shalev, 2008).

Conclusion

Prisoners are among the communities that are mostly prone to suffer from poor health services access and should be prioritised by building a solid healthcare system at prisons. Consequently, prisoners are at high risk of malnutrition and health insecurity, and thus increasing the risk for morbidity and mortality at the national level. Numerous international organisations made collaborative efforts to develop technical agreements, policies and conventions highlighting the right for prisoners to receive proper food and health services without any discrimination. In light of the policies and studies that were mentioned so far, I am highlighting the necessity to fulfil the right to health, including nutrition and health services for prisoners without discrimination and adhering to the minimum standard rules. In fact, these efforts can support the goal of national healthcare systems in promoting good health for all. It has been suggested by some studies that male prisoners lose weight in prisons while imprisoned females gain weight. On the other hand, underweight is common in prisons of Africa and South America. When it comes to discrimination and gender inequity, it has been noticed that imprisoned women are often marginalised in receiving good nutrition and health services in prison, especially in the case of pregnant and breastfeeding women. Children accompanying their mothers in prison face challenges in nutrition and growth, and consequently their nutrition and health should be of top priority within the health services provided to detained women.

Another important finding by several studies was that prisons in developed countries offered better quality and frequency of meals in comparison to prisons in underdeveloped countries, which is quite reasonable, as prison systems in the former countries are expected to have better spending power and means than prisons in the latter countries. Generally, inmates in underdeveloped countries suffer from health insecurities due to overpopulation, lack of space, and inadequate access to health services. In terms of micronutrients status in prisoners, minor

deficiencies have been noted especially for Vitamin D due to limited outdoor access. Regarding the effect of solitary confinement on health, it has been suggested that it negatively impacts both the physical and mental wellbeing of prisoners, especially if applied for more than 10 days.

Throughout my research, I did not find any complete tool to properly assess the prisoner against human rights standards and nutritional requirements, thus further work is needed to establish this.

As related to my geographical interest, there is an absence in research regarding diet, food, and health of prisoners in the Middle Eastern and North African (MENA) regions. In summary, future studies are therefore recommended at two levels. First, research efforts must be optimised to develop nutrition and health assessment tools for prisons. Second, studies should be initiated in the MENA region to assess the fulfilment of Human Rights (specifically those related to health), diet adequacy, and health services within the prisons in this region.

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