

Yusias H Diani_Diet and nutrition based non- communicable diseases

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2 **Diet and Nutrition Based Non-Communicable**
3 **Diseases: an Epidemiology Perspective**

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15 **ABSTRACT**
16

Aims: to revisited the diet and nutrition based non-communicable diseases (NCD) with emphasize on undernutrition and over nutrition with its related factors

Discussion: the condition of weight related derangement such as unintentional weight loss or underweight, overweight and obesity are still a major NCD related health problem because these are rapidly emerging derangement in nutritional status from the epidemiological perspective. The paradox of nutrition transition shifts for global nutritional status due to excessive intake with sedentary lifestyle which occur since very early in life causing overweight and obesity, but on the other hand, undernutrition or even malnutrition due to insufficient intake and perhaps in combination with prolonged and persistent infection also happen. The burden persists, even keep raising, especially among vulnerable group of the community, namely women and children. Mostly, it is related to unhealthy dietary habits consists of overconsumption in sugar, saturated fat and cholesterol, and also salt, with restricted dose of vegetables and fruits. Once again, malnutrition is a silent but deteriorating condition which cover from undernutrition, overweight, and obesity. Nutritional imbalances can precipitate series of events consisting of insulin sensitivity which leads to insulin resistance, chronic oxidative stress, and its related inflammation- usually also happen chronic systemic and low grade, which can lead to NCD development.

Conclusion: From the epidemiology perspective, the persistent and even emerging diet and nutrition based NCD are important to tackle immediately because their effect, short and long term, which can affect the well being of vulnerable individuals, their community and even their country. Every preventive effort must be practiced by all stakeholder.

17
18 *Keywords: malnourished, overweight, malnutrition, Ultra-processed foods, cardiometabolic,*
19 *co-infection*

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22 **1. INTRODUCTION**
23

24 From an epidemiological perspective, noncommunicable diseases (NCDs) are a class of
25 diseases with complex causes, long courses, and insidious onset. These diseases are a major
26 health challenge in the 21st century, accounting for 74% of all deaths worldwide. NCDs are
27 basically associated with five main risk factors: tobacco use, physical inactivity, unhealthy
28 diets, harmful use of alcohol, and air pollution; but in this mini-review, discussion limited only
29 to diet and nutrition based non-communicable diseases

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30 The main indicators of nutritional status, which measured using body mass index (BMI,
31 formerly called the Quetelet index) [1], comprise the condition of weight related derangement
32 such as unintentional weight loss or underweight, overweight and obesity [2]. Other condition
33 related to nutrition is height related disorder namely short stature (Z-score of less than -2) [3].
34 These are rapidly emerging derangement in nutritional status from the epidemiological
35 perspective. The nutrition transition shifts for global nutritional status [4] can be divided into
36 over nutrition related to excessive intake with sedentary lifestyle, which already started from
37 younger age [5,6] while undernutrition or even malnutrition due to insufficient intake [7] and
38 perhaps in combination with prolonged infection [8,9]. In some countries, there are paradox
39 where both of these conditions took place at the same time [10,11] and the burden keep
40 raising, especially among vulnerable group of the community, namely women and children.

41 Global data revealed that roughly estimated one-third of the world's population is affected by
42 malnutrition [12], with more or less one billion individuals experiencing undernutrition due to
43 insufficient intake of macronutrient (protein, carbohydrate) and also micronutrient consumption
44 [14]. There are some regions in the world which are battling the difficulty of the poor growth of
45 children, deficiency of micronutrients but at the same time having adults with exceeding BMI
46 [15]. The aim of this minireview is to revisited the epidemiological perspective regarding diet
47 and nutrition based non-communicable diseases.

48 2. CURRENT SITUATION DIET AND NUTRITION BASED NON-COMMUNICABLE 49 DISEASES

50 According to the 2023 WHO fact sheet [16], Noncommunicable diseases (NCDs) morbidity
51 roughly reach the number of 41 million individuals annually, it is equivalent to 74% of all deaths
52 globally. Each year, 17 million individual mortalities due to NCD before reach the age 70; 86%
53 of these premature deaths occur in low- and middle-income countries. Of all global NCD
54 morbidity, 77% are happen in low- and middle-income countries.

55 There has also been an increase in trend of non-communicable disease (NCD) according to
56 their populations which initially suffering undernutrition at the early stages of life, e.g.,
57 happened in early childhood [17] and whom their mothers suffering undernutrition before and
58 during pregnancy [18]) and then turn to be overweight during adulthood, as this can be
59 predicted [19].

60 An interesting phenomenon observed among children whose mothers were undernourished
61 during pregnancy, there is increased risk of stunting during early life, but then develop and
62 suffer from non-communicable disease such as type 2 diabetes and even obesity during
63 his/her adulthood life [20,21]. Excessive and rapid weight gain in children [22] often associated
64 to the elevated risk of cardiometabolic diseases [22,23] and uncontrolled obesity [24,25] later
65 in life. Nutritional balance during pregnancy is very crucial [26,27] in order to avoid unwanted
66 adverse pregnancy outcomes [28] and the initial poor growth and development of children in
67 the future [21,26,27].

68 Obesity among children and adults has definitely intensified and represents a global major
69 health problem [29]. Prolonged exposure to unbalanced and unhealthy diet such as Ultra-
70 processed foods (UPF) which contain low fibers but unfortunately enormous sugar, salt and
71 fat [30] as one of the causative agent cardiometabolomic disease among adult. Greater
72 exposure to UPF was associated with a higher risk of adverse health outcomes, especially
73 cardiometabolic disease[20,22,23,30], certain mental health derangement such as depression
74 and anxiety [31], and elevated mortality outcomes compares to other disease condition- a
75 study measured those who consumed the highest amount of UPF had higher risk of mortality,
76 for every 10 % of the energy intake from UPF consumption, an increase of 15 % in the hazard

77 of all-cause mortality was observed [32]. All of these important results of different studies
78 regarding diet and nutritional based non communicable disease are actually accommodate a
79 rationale for future study regarding the development and evaluation of the effectiveness of
80 using epidemiology approach [33] e.g., large population based study and in combination with
81 public health measures, to aim and lessen or if possible to cut dietary exposure to ultra-
82 processed foods for boosted daily human health status.

83 3. THE DANGER OF DIET AND NUTRITION BASED NON-COMMUNICABLE 84 DISEASES

85 Unhealthy diets [4,14] and malnutrition [7,12,13,15] are major risk factors for non-
86 communicable diseases (NCDs), which are responsible for 71% of global deaths, annually.
87 [34]. This invisible pandemic called NCDs [35] include several sedentary related diseases
88 such as cardiovascular disease, some types of cancer, diabetes, hypertension, and stroke.
89 Most of these disease related to unhealthy dietary habits [36] are typically characterized by
90 high ingredients in sugar [37], saturated fat and cholesterol [38], and also salt [39], and limited
91 amount in daily consumption of vegetables and fruits [40]. Once again, malnutrition is a silent
92 but deteriorating condition which cover from undernutrition, overweight, and obesity.
93 Nutritional imbalances can precipitate series of events consisting of insulin sensitivity [41]
94 which leads to insulin resistance [42], chronic oxidative stress [43], and its related
95 inflammation- usually also happen chronic systemic and low grade [44], which can lead to
96 NCD development. Alves et al [45] reported that nutritional status in early life may also be
97 related to future cardiovascular disease development. Cardiovascular disease risk factors,
98 e.g., dyslipidemia, obesity, insulin resistance and hypertension, intensify the atherosclerotic
99 process which begins in childhood and progresses throughout the life span [46]. The constant
100 milieu of metabolic and neuroendocrine of the fetus is essential fetal programming in the
101 formation of future body's "metabolic programming" [47].

102 On the other hand, the problem of recurrent micronutrients deficiency is also global health
103 importance [48], especially in the low to middle income countries [49]. Important micronutrients
104 that may be insufficient or even deficient namely iron [50], folic acid or folate [51], vitamin A
105 [52], vitamin D [53], zinc [54] and iodine [55]. These micronutrients are vital for the body to
106 function properly [48-55], and their deficiency can have serious health consequences [50-55].
107 Micronutrient deficiencies are a global health concern especially among specific vulnerable
108 group of the population namely the preschool-aged children and women of reproductive age
109 [56,57]; affecting >30% of the world's population or in number roughly reached 2 billion
110 individuals [58]. early-life nutritional deficiencies carry life-long effects arbitrated via numerous
111 mechanisms such as aberrant metabolic shift which further become metabolic programming
112 [9, 59], stunting [60], remodeled body composition [61], and the shift in gut microbiome
113 composition due to the diminished number of normal microflora [62,63]. However, until
114 recently, this is remaining unexplored in the condition of multiple micronutrient deficient host
115 or even worse, in the condition of co-infection.

116 Such unwanted deficiencies may be the direct consequences of poverty related condition [64],
117 such as low income or low level socioeconomic [65], poor housing, water, sanitation and
118 hygiene practice [66], insufficient health care especially in low resource setting [67], and poor
119 diet in term of quantity or quality [68], and these further exacerbate poverty through prevented
120 optimal intellectual development, lost wages due to inability to achieve higher skill and
121 increased health care costs that can significantly reduce earning potential [69].

122 A deficiency of such micronutrients may also lead to poor pregnancy outcomes in vulnerable
123 women [26,28], poor growth and development in children [8,17,21], and other health disorders,
124 including poor vision (essential nutrients like Vitamin A, Vitamin B1 (thiamine), Vitamin B12,

125 Vitamin C, Vitamin D, Vitamin E, Zinc, and Folate (Vitamin B9) in maintaining eye well-being)
126 [70], goiter due to Iodine deficiency [71], cutaneous lesions which can be seen manifested in
127 skin, nail and hair [72], and possibly mental conditions which according to Zilienska et al [73]
128 “ in particular, deficiencies in B vitamins family, i.e., B1, B6, B9, and B12, have been linked to
129 depression, as they are essential for neuronal function. They also have a protective effect
130 against hypercysteinaemia, associated with an increased risk of mood disorders”. Zinc
131 deficiency also worth to mention because it is indispensable for the nucleic acid metabolism
132 and stability for protein synthesis, gene expression, cell division, and enzyme activity. An
133 imbalance in the diet may lead to mild-to-severe of these micronutrients and its association
134 with metabolic properties among individuals, especially children and adolescents, which may
135 possibly be also attributed to gender, age, race and are still need to be explored, thus
136 warranting future studies on the topic.

137 Some aspects related or even possibly become the determinants and preventive measures
138 for undernutrition must be carefully considered. The condition of poor nutritional outcomes in
139 children might be prevented with optimal birth spacing, which according to Ntambara et al [74]
140 that longer birth intervals (≥ 24 months) are significantly associated with decreased risk of
141 childhood undernutrition and that an optimum birth interval of 36–48 months might be
142 appropriate to reduce the prevalence of poor nutritional outcomes in children, especially
143 underweight. Governments responsiveness [75] through the family planning programs [76]
144 and its related policies can actively apply policymaking in order to achieve better and healthier
145 maternal and children.

146 4. CONCLUSION

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148 From the epidemiology perspective, the persistent and even emerging diet and nutrition based
149 NCD are important to tackle immediately because their effect, short and long term, which can
150 affect the wellbeing of vulnerable individuals, their community and even their country.
151 Preventive measures must always be practiced by all stakeholder.

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159 **COMPETING INTERESTS**

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161 "Author have declared that no competing interests exist."

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163 **AUTHORS' CONTRIBUTIONS**

164

165 The sole author designed, analyzed, interpreted and prepared the manuscript

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167 **CONSENT (WHERE EVER APPLICABLE)**

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169 Not needed

170

171 **ETHICAL APPROVAL (WHERE EVER APPLICABLE)**

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173 Not needed

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437 DEFINITIONS, ACRONYMS, ABBREVIATIONS

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APPENDIX

Yusias H Diani_Diet and nutrition based non-communicable diseases

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