



A REVIEW

Relationship of organic farming and human health

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Abstract : In the last decade, the assembly and ingestion of organic food have exaggerated steady worldwide, despite the lower productivity of organic crops. Such foods run by organic standards of manufacture, management, dispensation, and marketing. Most notably, the employment of artificial fertilizers, pesticides, and genetic modification isn't allowed. One major reason for the exaggerated demand is that the perception that organic food is a lot of environmentally friendly and on the mend than conservatively made food. Shoppers of organic food tend to possess healthier dietary patterns overall. Medicine studies purpose to the negative effects of bound pesticides on children's psychological feature development at current levels of exposure. Such risks will be decreased with organic food, particularly throughout maternity and in infancy, and by introducing non-pesticidal plant protection in typical agriculture. There are units few familiar integrative variations between organic and traditional crops. Maybe most significantly, there are indications that organic crops have lower metal content than typical crops because of variations in fertilizer usage and soil organic matter, a difficulty that's extremely relevant to human health. Organic milk, and possibly additionally meat, contains a higher content of omega-3 fatty acid fatty acids compared to traditional product, however this is often unlikely to be nutritionally vital in lightweight of alternative dietary sources. The current use of antibiotics in typical animal production may be a key driver of antibiotic resistance. The hindrance of disease and a lot of restrictive use of antibiotics, as practiced in organic production, may minimize this risk, with probably tidy edges for public health. This review summarizes the scientific proof for integrative variations and health edges of organic compared with conventionally made food.

Key Words : Antibiotics, Food safety, Nutrients, Organic food, Chemical residues

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INTRODUCTION

Although ancient organic farming practices have prevailed for thousands of years, the trendy organic movement began in Europe within the Nineteen Twenties. The most motivations were to preserve and develop the fertility of the soil and to counteract the manufacture of

agriculture. Over the subsequent decades, avoiding the growing dependence on artificial fertilizers and pesticides additionally became a motivation (Huber *et al.*, 2011) From the point in time, this shunning was supported principle as a result of substantial information of the adverse effects of intensive use of fertilizers and

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pesticides initial emerged throughout the Sixties, exemplified by the chemical insecticide (dichlorodiphenyl-trichloroethane), introduced within the Forties. Insecticide was cheap to provide, effective in killing pests, and had low acute toxicity to vertebrates. Over time, proof of the adverse effects of insecticide and alternative persistent chemicals on the surroundings and human health accumulated and eventually became a public concern. Carson's book *Silent Spring* (published in 1962) was instrumental during this assessment (Crinnion, 2010). As insecticide was prohibited, sooner degradable pesticides were developed by the chemical industries. However, although less persistent, these weren't essentially harmless to the health of humans, animals, and therefore the surroundings (Abell *et al.*, 1994). Though rules and restrictions apply, (Dangour *et al.*, 2009) the worldwide use of pesticides is currently over 2 million tons annually and increasing (FAO, 2012). Use of pesticides and artificial fertilizers combined with intensive irrigation and specialized crops have resulted in exaggerated food production. Organic farming systems area unit typically delineate as Associate in nursing inefficient approach to fulfill future wants for world food production (Mark *et al.*, 2014).

The term organic farming was initial utilized in the Forties to explain the employment of organic materials for soil fertility and includes a holistic read of soil, crops, animals and society. The core of organic agriculture may be a systematic approach that has crop rotations; diversity in crops and livestock; grazing; soil improvement, partly by the applying of animal manures and compost; and blighter management while not the employment of artificial pesticides. The increasing quality of organic food and farming has prompted the requirement for organic certification and standards. The International Federation of Organic Agricultural Movements (IFOAM) was supported in 1972 and 283 organic certification bodies' area unit currently operational in a hundred and seventy countries worldwide. All food oversubscribed as organic should be certified intrinsically by approved organic management bodies in line with outlined criteria) Commission Regulation (EC) (2008) (<http://www.ecfr.gov/cgi-bin/text-idx?c=ecfr;sid=a7844f8b7d68c6c9da55dd550475b7c5;rgn=div5;view=text;node=7%3A3.1.1.9.32;idno=7;cc=ecfr=237:3.1.1.9.32.2.354.4.>, 2010) .

The overall aim of organic agriculture, whether or not in farming, processing, distribution, or consumption,

is to sustain or improve the health of the soil and therefore, the system from the tiniest organisms within the soil to people in general. The four principles of organic farming are health, ecology, fairness, and care (Dangour *et al.*, 2010) (IFOAM). Organic farming permits no use of agrochemicals (artificial pesticides, growth regulators, and artificial soluble fertilizers), no use of genetically changed organisms (*i.e.*, plants, animals, or micro-organisms within which the genetic material has been manipulated and restricted use of medical specialty and pesticides approved to be used in organic farming. what is more, it emphasizes the employment of diversity and therefore, the rotation of crops and farm animal, rising soil and utilization materials and energy.

The global organization of Food and Agriculture states that "Organic agriculture can be a holistic production management system that promotes and enhances health of agricultural ecosystem, as well as biodiversity, biological cycles, and soil biological activity".

These aspects might place organic agriculture in a position to provide assistance in improving crop diversity and environmental and human health. The idea that organic foods area unit healthier than conventionally made foods is a very important reason why interest in organic food is increasing worldwide.

In the disputation, discussions concerning organic food typically become polarized and simplified all the way down to the question of that if organic or standard food is "better". Association is also relevant from a slim shopper perspective as a result of the consumer's selection is usually targeted on merchandise with or without an organic label. However, most scientists instead are getting to perceive the impact of various farm management systems on human health, animal prosperity, food security and environmental property, with the long-run goal of developing property food systems, instead of deciding that of the presently existing systems is "better". Many intergovernmental organizations have created the event of property food systems a high priority.

Studies showing health effects of organic food consumption in humans :

To date, only a few studies are performed that directly investigate the result of organic food on human health. There are indications from these studies that organic food consumption is related to a lower risk of childhood allergies. Adult customers World Health Organization of ten times eat organic food are less

doubtless to be overweight or corpulent compared to different customers. However, the proof for this result is presently not conclusive as no long-run studies have nevertheless been dole out. Moreover, it's inherently tough to separate organic food consumption from different associated life-style factors which will have an effect on human health (Ren *et al.*, 2001).

Consumption of organic food and sustainable diets:

It is best-known, however, purchasers (aka customers) often buy or consume organic food have healthier dietary patterns, like a better consumption of fruit, vegetables and wholegrain merchandise and a lower consumption of meat, compared to different customers. These dietary patterns are related to varied health edges that embody a reduced risk of chronic diseases like sort a pair of polygenic disorder and vessel diseases. These patterns conjointly coincide with patterns that are favorable from the attitude of environmental property, like greenhouse emission emissions and land use. more evaluations got to be undertaken on the extent to that the organic agro-food system, comprising production and consumption, will function associate example of a property food system with relevance health and environmental effects (FAO, 2012).

Experimental studies of *in-vitro* and animals :

A small range of *in-vitro* studies purpose to completely different biological activities of organic and standard crops on human cell lines. However, it's unclear whether or not any of the discovered activities are preferred. Many animal experiments victimization feed composed from equivalent ingredients, however, from organic or standard production, recommend that the feed production system features a completely different impact on the event of animals. Specifically, two-generation animal studies indicate an impression of the feed production system on the offspring's system. However, it's presently unclear however these observations translate into effects for humans, if at all.

Pesticides Organic farming mostly depends on preventive measures for plant protection, thus, the utilization of pesticides is low and potential risks to human health are mostly avoided. A tiny low range of pesticides are approved as curative measures however, with some exceptions, these are typically of low material medical concern. Overall, consumption of organic food well decreases the consumer's dietary chemical exposure,

additionally as acute and chronic risks from such exposure. Pesticides endure a comprehensive risk assessment before market unleashes, however, vital gaps stay. Of major concern, these risk assessments disregard proof from medicine studies that show negative effects of low-level exposure to insect powder pesticides on children's psychological feature development, despite the high prices of IQ losses to society. Whereas the intake of fruit and vegetables mustn't be shriveled, existing studies support the best of reduced dietary exposure to chemical residues, particularly among pregnant ladies and youngsters (Agence Fr. Secur. Sanit. Aliment, 2003).

Organic agriculture provides each a supply of food with low chemical residues associated surroundings during which scientific discipline techniques for pesticide-free plant protection are developed. These techniques are adopted in standard production, thereby aiding a transition towards integrated blighter management and overall lower chemical exposure of the population and therefore the surroundings. Production system and composition of plant foods Organic farming in the main depends on animal and manure for crop fertilization; soluble mineral fertilizers are typically not approved. The full quantity of plant nutrient fertilization, specifically gas, is lower in organic agriculture. The distinction within the quantity and plant handiness of plant nutrients has some result on plant development and overall plant composition.

However, the nutritional price of plant foods is simply slightly plagued by organic vs. standard management and, supported what's presently best-known, is proscribed to a moderately higher content of synthetic resin compounds in organic foods. Though synthetic resin compounds are believed to mediate protecting effects against bound chronic diseases in humans, it's not presently doable to translate such variations into specific health edges from crops in either system. The minerals and vitamins content is mostly similar once conventionally and organically made crops are compared. Crop selection, soil type, weather, atmospheric condition and different factors conjointly have an effect on crop composition.

The long-run use of mineral phosphorus plant food has contributed to exaggerated metallic element concentrations in agricultural soils. Though, often not bound to happen the crops made by organic farming, specifically cereal crops, have relatively low metallic element concentrations.

This is extremely relevant to human health as a

result of food is that the dominant route of human exposure to metallic element in non-smokers. The population's current metallic element exposure is near to, and in some cases higher than, tolerable limits. There are no studies scrutinizes the consequences of long-run organic vs. standard farm management on metallic element concentration in crops. However, long-run experiments over quite one hundred years indicate that cereal crops inseminated with mineral plant food tend to possess a better metallic element content compared to cereal crops inseminated with animal manure. This issue is extremely relevant to human health and deserves more investigation. For different harmful metals, current proof suggests that the assembly system has no influence on metal concentration in crops.

Foods based on animal products :

Animals in organic agriculture have many accesses to forage and receive relatively low amounts of concentrate feeds. It's well established that the carboxylic acid composition of the feed affects the fat acid composition of milk, eggs and meat. As grass and herbaceous plant have a high content of polyunsaturated fatty acid fatty acids, organic milk has been found to possess AN around fifty to the next content of polyunsaturated fatty acid fatty acids on the average compared with standard milk. The same result has been discovered for organic meat, though there's less supporting proof of this. Whereas better polyunsaturated fatty acid content in itself represents a bonus from a nutritional purpose of bread, milk, dairy farm product and meat account for under a minor proportion of dietary polyunsaturated fatty acid intake within the human diet. Supported current information, the calculated extra human polyunsaturated fatty acid intake from organic animal product cannot be cypher to any specific health profit. Another cluster of fatty acids, ruminant fatty acids, area unit found in higher concentrations in organic compared to traditional milk. However, the results of those fatty acids for human health are still unclear. Most different fatty acids don't seem to be or solely slightly full of the assembly system.

Resistance to antibiotics :

Globally antibiotics are employed in animal production than for human health. The planet Health Organization has known the too current use of antibiotics in animal production to be one amongst the tributary

factors to inflated antibiotic resistance in microorganism. However, the restricted use of antibiotics in organic systems may minimize this risk. Organic broilers and pigs, however not dairy farm cows, area unit less possible to develop diseases associated with intensive production compared to animals in standard production. As a consequence, less use of antibiotics for treating clinical diseases is needed. However, there area, unit and size varies in use between species and countries.

Furthermore, use of antibiotics is heavily restricted in organic agriculture while upkeep of animal health instead depends up on preventive management factors such as hygiene measures and decreasing stocking density. The utilization of antibiotics has been clearly coupled to the chance of developing antibiotic resistance in microorganism. Consequently, there's a lower risk of the event of antibiotic resistance in organic agriculture. There is a unit many routes for resistant microorganism and resistance genes to maneuver from cattle to humans (Mark *et al.*, 2014).

Knowledge dissemination between standard and organic production is also a crucial step in decreasing the utilization of antibiotics in animal production overall. However, hypothetically, a transition to organic production for the full placental sector would, on its own, be solely a part of an answer to the antibiotic resistance issue, as a result of factors outside animal production, like their use in humans, are going to be unaffected.

Types of studies helping to analyze the effects of organic products :

Intervention studies :

Societal interest in health effects of organic product comes from customers. Seeking for scientific proof to answer the inquiries of this cluster, studies among humans area unit most convincing, particularly alleged 'intervention studies'. during this study style as several factors as potential have to be compelled to be controlled for a gaggle of individuals (as such a large amount of factors aside from nutrition do have an effect on people's health and well-being) and solely the food below study is clearly varied so as to create potential effects show. Thus either a set-up must be created wherever a gaggle of individuals is brought voluntarily into a controlled scenario, or special things have to be compelled to be found wherever teams of individuals live daily below identical conditions and within the same routine, like children's homes, monasteries or prisons. In such a

controlled scenario ideally 2 matched teams ought to consume parallel either organically or conventionally big food, blinded. Or a 'cross-over' scenario is made wherever the various take a look at foods area unit conferred, one when the opposite with ample time in between (Dangour *et al.*, 2010).

Health effects are going to be measured victimization 'biomarkers', known as reliable reflection measurements for a person's health standing, which will in such a study style be measured altogether study objects at identical moment. The selection and presentation of food product can be taken as factors to require attention.

Empiric studies :

Another way to check health effects in humans area unit the alleged empiric or medicine studies, wherever an oversized cluster of individuals is studied victimization questionnaires typically supplemented with some measurements in an exceedingly smaller part of the cluster. Management is far less as folks themselves report. Investigations will recollect at intake habits within the past, being 'retrospective', or follow a gaggle from an explicit moment into the longer term, being 'prospective'. Queries have to be compelled to address more factors than food, e.g., life-style factors and status, to be ready to rule out contradictory. Thus an oversized cluster of individuals must be enclosed within the study (Crinnion, 2010).

Intervention studies in animals :

As extremely controlled blind human dietary intervention studies, particularly if meant to look at long-run physiological responses, are terribly overpriced and troublesome to appreciate, health effects of foods area unit typically tested in animal models. Almost like human intervention studies, in such experiments laboratory animals like rats, mice, chickens and rabbits area unit fed organically or conventionally big feeds, and selected physiological parameters reflective measurements of health standing area unit analyzed. By selecting genetically solid populations of animals and keeping them below extremely controlled conditions it's easier to signify health effects of a diet. Moreover, the short life cycle of animals permits examining effects of diets on over one generation. Systematic reviews of such animal studies will provide indications of potential health effects, the variations between animals and men have to be compelled to be taken into consideration. Final

confirmations of hypothesized effects would like eventually to be verified in humans.

***In vitro* studies :**

The alleged *in vivo* studies, relating experimentation employing a whole, living organism, square measure typically substituted by low price *in vitro* experiments. this sort of analysis aims at describing the results of experimental variables on the organism's constituent components (e.g., organs, tissue- or cell cultures, cellular components) in a very controlled atmosphere outside the organism (test tubes, Petri dishes). *In vitro* studies square measure extremely targeted, enabling to deduce mechanisms of actions and to manage several unsupportive variables. However, weakness of this sort of studies is that the uncertainty that the results discovered at cell level would occur within the 'real world' the complicated living organism (Huber *et al.*, 2011).

Medical studies in humans :

Investigations to judge directly the potential effects of consumption of organic merchandise in humans square measure scarce and square measure largely supported terribly tiny samples and of short period. For example, Smith-Spangler *et al.* (2012) terminated that no clinically meaningful variations in *in vivo* health-related biomarkers or nutrient levels were found once comparison subjects WHO consume organic or standard food (Dangour *et al.*, 2010).

Effects of organic vs. standard diet on health :

There are no clinical human studies evaluating the direct impact of associate degree organic diet on health. The probable reason for this can be that any effects on human health would be doubtless to be semi-permanent effects and it's methodologically tough and valuable to perform semi-permanent dietary interventions.

Effects of organic vs. conventional diet on health-related biomarkers :

An alternative to checking health outcomes is to study levels of health-related intermediate biomarkers which will answer associate degree intervention additional quickly. Some revealed clinical studies or controlled trials have investigated the variations between organic versus standard food consumption on health-related biomarkers (including inhibitor activity and standing, low-density lipoprotein reaction or plasma

triacylglycerol, semen quality, homocysteine, glycaemia etc.). Most of them reported null findings, however, it ought to be noted that there are only a few of those studies and that they have largely been supported a restricted variety of subjects, square measure of terribly short period and have a really specific modification in diet (one food item for example) and square measure so doubtless to steer to poor applied math power.

A small Italian cross-over study was conducted on a hundred and fifty men (100 healthy male people + fifty male chronic nephrosis (CKD) patients) (De Lorenzo *et al.*, 2010). Mediterranean diets composed of foods from organic or standard production were in turn administered for fourteen days every. The authors reported a statistically important improvement in fat mass and homocysteine all told subjects, and in weight and body mass index in CKD patients solely. However, variety of limitations ought to be highlighted, as well as the absence of permutation within the order of the diets.

Effects of organic vs. conventional food on pesticide exposure:

Pesticide residues square measure necessary food contaminants. Many studies are conducted to assess the impact of associate degree organic diet on chemical remains in human's mistreatment pee bio observation. The studies show an analytically report of adistinctly lower concentration of chemical remains in pee among children or grown-ups.

Effects of consumption of organic vs. conventional food on nutritional biomarkers :

Some clinical trials have investigated the nutritionary plasma biomarkers of participants WHO were offered organic food compared to the management (Huber *et al.*, 2011). The nutritionary biomarkers embody polyphenol excretion, carotenoids (in explicit flavonoids), phosphorus and vitamin C. Overall no variations were reported aside from a irregular controlled cross-study news higher quercetin and kaempferol excretion once a three-week organic diet. No distinction in inhibitor capability was detected.

Recently a tiny low double-blind, cross-over intervention trial (three dietary periods of twelve days with a two-week-long wash-out) was conducted among thirty three men. This study reported no distinction in intake or bioavailability of metal, intake or bioavailability of copper, or plasma standing of carotenoids between

the organic and traditional diets (Reganold and Wachter, 2016 and Soltoft *et al.*, 2011).

Here again, because of potential shortcomings regarding applied math power and style, these studies are too restricted to conclude the absence of a link. Especially, experimental styles largely pertain to a restricted introduction of organic foods (fruit juice or tomatoes), that in all probability doesn't mirror the subjects' actual organic diet and therefore, ends up in a restricted magnitude result (Dangour *et al.*, 2010).

Future research :

None of the human empiric studies that examined health effects related to the consumption of organic compared with typical foods enclosed biomarkers to versus typical exposure. During a strict sense, such biomarkers might not exist as a result of there's no distinct demarcation between organic and traditional agricultural practices; rather, the excellence features a wide border zone. Absence of markers of pesticide/other chemical use isn't exclusive to shoppers of organic foods, and whereas high levels of artificial fertilizers could leave a organic chemistry fingerprint, typical farmers typically request to limit the utilization of those product, not the smallest amount for economic reasons. All strategies utilized in organic farming can be utilized in typical farming only difference being the restrictions applied. Therefore, any organic chemistry markers or patterns indicative of organic food consumption would indicate organic or near-organic food, instead of organic in and of itself (Abell *et al.*, 1994). A lot of careful assessment of organic consumption is required to decrease the chance that ascertained associations are caused by factors apart from the organic exposure. Studies of associations between the dietary qualities, together with organic food consumption, chemical exposure and novel biomarkers, like gut small biota-based change of location biomarkers in prospective empiric studies, are so secure (Agence Fr. Secur. Sanit. Aliment, 2003).

Comparative studies on nutritional value :

Compositional knowledge from studies scrutiny organically with conventionally created merchandise is vital in the main to get a lot of insight into the relation between cultivation practices and organic process content. This may alter the assembly of very best quality merchandise. As already mentioned higher than, the connection between the organic process price of a

product and health is tough to predict and that we thus counsel golf stroke the main focus of future analysis a lot of on studies in animals and humans. For such studies it'll be vital to outline markers, e.g., fingerprints or different for representative organic food merchandise (Dangour *et al.*, 2010).

Intervention studies :

To study the consequences of a particular food or a diet on health, intervention studies may be tired animals still as in humans. For such studies solely very best quality merchandise from the assembly systems are to be won't to guarantee smart analysis on the potential impact of the organic food. The hypothesis of the doable increase within the capability of resilience as a result of organic food consumption ought to be studied victimization challenges. For the studies in humans it's vital to outline specific biomarkers for expected effects from representative food merchandise.

Empirical studies :

Big population studies in humans are vital to substantiate health effects at intervals an outsized population. Such studies may show sudden relationships that can't be investigated with intervention studies due to the time-frame and supply. As long as biomarkers don't provide clear answers and also the lag time before discernible health effects occur is just too long, empirical studies will fill this gap. It's economical to connect the organic question to huge, already current studies (Ren *et al.*, 2001).

In vitro models :

Development of in vitro models might be valuable to elaborate mechanisms by that organically created foods may influence the health status (De Lorenzo *et al.*, 2010).

Conclusion:

Consumer studies still show that expectations regarding health effects of organic food are regarding the strongest motives for customers to shop for organic merchandise and analysis results on this subject will judge high social interest. However, there's an insufficiency of studies investigation the potential helpful effects of organic compared to traditional food consumption on health through an immediate estimation of the consumption of organic food. It ought to be noted that

enormous empirical prospective cohort studies developed throughout the Nineteen Eighties and Nineteen Nineties didn't embody an information assessment of organic food consumption. Therefore, such relationships cannot be scrutinized in these units. The accessible proof supports consumers' belief that organic food production and consumption lead to lower chemical exposure, are a lot of environmentally friendly, and should be higher for animal welfare. However, the impact on human health of the particular low-level chemical exposure from conventionally created foods isn't clear (Brantsaeter *et al.*, 2015). Some studies indicate higher organic process profiles in organic foods than in standard foods, however, the variations are largely little and should not be of sensible connection in nourished populations. Few studies have investigated the doable health edges of organic food consumption in humans. Whereas providing some indications, the accessible proof is proscribed and thus light to conclude whether or not organic food is healthier. The helpful health effects of vegetables and fruits and different foods suggested in an exceedingly diet are well documented, however, the jury remains out and not able to conclude whether or not selecting the organic alternatives would offer extra edges.

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