
Jelena Vulović¹, Snežana Knežević², Olivera Petrović³,
Miroslav Radulović³, Anđelka Dugalić³

ISHRANA I GLOBALNA SIGURNOST HRANE ZA OČUVANJE ZDRAVLJA

Sažetak: Svaka osoba zaslužuje pristup zdravoj, pristupačnoj i kvalitetnoj ishrani. Ovakav pristup je otežan dubokim nejednakostima koje proizlaze iz nejednakosti koje strukturiraju svakodnevne uslove života. Transformacija sistema ishrane u bezbednu hranu, poboljšanu i zdravu ishranu, pristupačnu za sve je važno globalno pitanje. Zdrava ishrana može igrati značajnu ulogu u održivosti sistema ishrane. Gojaznost u ranom detinjstvu je važan zdravstveni problem u razvijenom svetu, a pogađa i mnoge zemlje sa niskim i srednjim prihodima, posebno u urbanim sredinama. Nažalost, gojazna deca često ostaju gojazna i u odraslom dobu, i veća je verovatnoća da će razviti brojne hronične nezarazne bolesti u mladoj životnoj dobi. Postoji jasna veza između praksi hranjenja odojčadi i male dece i socio-demografskih karakteristika domaćinstva. Dojenje do navršene prve godine je manje uobičajeno kod dece u bogatijim domaćinstvima, urbanim sredinama ili kod visokoobrazovanih majki. Borba protiv neuhranjenosti zahteva političku posvećenost i simultane akcije više sektora, kao i značajna ulaganja u sprovođenje programa i praćenje napretka održivosti zdrave ishrane.

Ključne reči: Ishrana, nutrijenti, zdravlje, bolest

Abstract: Every individual deserves access to healthy, affordable, and quality nutrition. Such access is hindered by deep inequalities stemming from unjust systems that structure everyday living conditions. The transformation of the food system into safe, improved, and healthy nutrition accessible to all is a crucial global issue. Healthy nutrition can play a significant role in the sustainability of the food system. Childhood obesity is a significant health problem in the developed world and affects many

¹ Opšta bolnica Paraćin, Služba anestezije i reanimacije, Paraćin, Srbija

² Akademija tehničkih strukovnih studija Beograd, Srbija, lesta59@yahoo.com

³ Dom zdravlja Kraljevo, Srbija

countries with low and middle incomes, particularly in urban areas. Unfortunately, obese children often remain obese in adulthood, increasing the likelihood of developing numerous chronic non-communicable diseases at a younger age. There is a clear link between infant and young child feeding practices and the socio-demographic characteristics of households. Breastfeeding up to the age of one is less common in wealthier households, urban environments, or among highly educated mothers. Combating malnutrition requires political dedication and simultaneous actions across multiple sectors, along with significant investments in program implementation and monitoring progress towards sustainable healthy nutrition.

Key words: Nutrition, nutrients, health, disease

UVOD

Zdrave navike u ishrani su neophodne za održavanje zdravlja i opstanak, dok ljudi često konzumiraju više hrane nego što je potrebno za preživljavanje. Hrana je duboko povezana s kulturom, sećanjima, načinom života i emocijama. Porodice, škole i poslodavci oblikuju društvene norme putem politika i okruženja koja mogu podržavati ili ometati zdrave navike u ishrani. Nasuprot tome, industrija hrane i pića utiče na izbor i potrošnju putem marketinških strategija, veličine porcija, sastava hrane, informacija o ishrani, lokacija prodavnica, ponude u restoranima i cena (1). Industrija zabave i sporta ima uticaj na promociju, dostupnost i plasman zdrave hrane u sportskim, filmskim i drugim zabavnim prostorima. Loša ishrana ima brojne posledice, povezujući se s većinom hroničnih nezaraznih bolesti, uključujući gojaznost, dijabetes tipa 2, kardiovaskularne bolesti, hipertenziju, loše oralno zdravlje, osteoporozu, anemiju zbog nedostatka gvožđa i mnoge vrste raka (2).

Neuhranjenost u svim svojim oblicima tesno je povezana, bilo direktno ili indirektno, s glavnim uzrocima smrti i invaliditeta širom sveta. Ova situacija obuhvata perinatalne i zarazne bolesti, kao i hronične (3). Ekološke varijacije u stopama bolesti uključuju ishranu kao jednu od primarnih determinanti. U svetu u razvoju, brojne bolesti nedostatka hranljivih materija opstaju i sada koegzistiraju sa sve većom incidencijom hroničnih bolesti povezanih sa ishranom. Društva u razvoju sada nose dvostruki teret neuhranjenosti sa pojavom takozvanih bolesti bogatstva usred uporne pothranjenosti u njihovoj populaciji (4).

U ovom radu fokusiramo se na analizu ključnih izazova u vezi sa ishranom širom sveta, sa ciljem dubljeg razumevanja uticaja na zdravlje i identifikacije strategija za unapređenje ishrane i prevenciju bolesti.

ZDRAVSTVENA BEZBEDNOST NAMIRNICA

Postizanje prehrambene sigurnosti domaćinstva zahteva adekvatno snabdevanje hranom svih članova domaćinstva, obezbeđivanje stabilnosti snabdevanja tokom cele godine i pristup, što naglašava značaj prava na proizvodnju i nabavku hrane. Nesigurnost hrane može proisteći iz nedostupnosti hrane, neadekvatne kupovne moći ili nepravilnog korišćenja hrane na nivou domaćinstva ili pojedinca (4). Ovo je složen fenomen koji se može pripisati nizu faktora koji variraju po važnosti u zavisnosti od regiona, zemalja i društvenih grupa, kao i tokom vremena (5). Opisuje se u smislu dostupnosti i stabilnosti hrane visokog kvaliteta, kao i pristupa hrani i njenog korišćenja.

Svi ovi kriterijumi moraju biti ispunjeni kako bi se ostvarila konzumacija zdrave ishrane i postiglo nutritivno blagostanje (6). Fokus na ishrani obuhvata fiziološke zahteve za različitim hranljivim materijama, determinante njihove bioraspoloživosti i bioutilizacije, kao i aspekte nege, zdravstvenih usluga i zdravog okruženja koji na to utiču. Sigurnost ishrane može se definisati kao adekvatan status uhranjenosti u smislu proteina, energije, vitamina i minerala za sve članove domaćinstva u svakom trenutku (7). I dok ova definicija ilustruje razmatranje potrebe za hranom kako bi se obezbedilo optimalno snabdevanje hranljivim materijama, odnosno fiziološkim potrebama, druge definicije bezbednosti ishrane usmeravaju pažnju na ranjive osobe i njihove potrebe u vezi sa neprehrambenim faktorima.

Ističući potrebu za promenom paradigme u formulisanju politike na sigurnost ishrane na nivou svakog pojedinca, Swaminathan (2008) definiše sigurnost ishrane kao fizički, ekonomski i društveni pristup uravnoteženoj ishrani, bezbednoj vodi za piće, higijeni životne sredine, primarnoj zdravstvenoj zaštiti i osnovnom obrazovanju (8).

Bezbednost hrane odnosi se na to da li je hrana bezbedna za ljudsku ishranu i da li ne sadrži biološke i hemijske zagađivače koji mogu izazvati bolest. Rastuća zabrinutost oko bezbednosti hrane na Zapadu predstavlja paradoks, jer su epidemiološki dokazi o bezbednosti hrane prilično suprotni percepciji javnosti i medija da je hrana koja je sada dostupna manje bezbedna nego što je bila. Poboljšanje javnog zdravlja praktično je iskorenilo pretežno infekcije koje se prenose hranom, a koje su ranije bile povezane sa morbiditetom i smrtnošću. Uobičajene bolesti koje se trenutno sreću na Zapadu obično su povezane sa blagim, samoograničavajućim gastroenteritisom. Studije percepcije rizika sugerišu da javnost postaje uznemirena zdravstvenim pretnjama koje su nesrazmerne stvarnom riziku povezanom sa bolešću, a ovu zabrinutost javnosti podstiču mediji koji zdravstvene probleme pretvaraju u medijske zdravstvene strahove zavisno od izveštavanja o pojedinačnim incidentima (4).

BALANSIRAN UNOS NUTRIJENATA

Zdravstveni stručnjaci sve više preporučuju ishranu zasnovanu na biljkama, obogaćenu voćem, povrćem, mahunarkama, integralnim žitaricama i orašastim plodovima, s ograničenim unosom crvenog mesa, te umerenom količinom mlečnih proizvoda, jaja, peradi i ribe, što je korisno za zdravlje i okolinu (9). Međutim, trenutni sistem ishrane nije održiv jer globalna proizvodnja hrane ugrožava stabilnost klime i otpornost ekosistema. Osim toga, veliki deo svetske populacije pati od neuhranjenosti, sa jednom od devet osoba koje su pothranjene ili gladne, jednom od tri osobe koje su gojazne, a procenjuje se da 2 milijarde ljudi pati od nedostatka mikronutrijenata (10).

Nezdrava ishrana je glavni uzrok neuhranjenosti, a oba faktora spadaju među prvih deset faktora rizika koji doprinose globalnom teretu bolesti (11) Injuries, and Risk Factors Study (GBD. Promene u telesnoj težini prate neravnotežu između unosa i potrošnje kalorija. Ova činjenica se često pogrešno interpretira, sugerišući da je gojaznost uzrokovana prejedanjem i nedostatkom fizičke aktivnosti i da se može lečiti jednostavnim savetima o smanjenju unosa hrane i povećanju telesne aktivnosti. Različite komponente energetske bilansa dinamički su povezane, a gubitak težine pruža otpor fiziološkim procesima (12).

MAKRONUTRIJENTI

Makronutrijenti – masti, proteini i ugljeni hidrati – pružaju energiju i osnovne komponente potrebne za održavanje života. Mast se sastoji od glicerola i masnih kiselina, proteini su sastavljeni od aminokiselina, dok su ugljeni hidrati jednostavni šećeri koji se javljaju kao monosaharidi ili lanci povezanih monosaharida (kao što je skrob), čije se veze hidroliziraju u ljudskom tankom crevu do monosaharida, ili su otporne na hidrolizu (kao dijetalna vlakna). Kombinacija ovih makronutrijenata je neophodna za održavanje dugovečnosti i zdravlja, iako nije definitivno utvrđeno da postoji optimalna kombinacija koja bi pružila najbolje zdravstvene beneficije. Ljudska populacija je kroz istoriju preživljavala na ishrani s različitim proporcijama ovih makronutrijenata (13). Iz evolutivne perspektive, ljudi su dobro prilagođeni za varenje skroba. Iako dijete s visokim sadržajem skroba, bazirane na korenastom povrću, mahunarkama i nerafinisanim žitaricama, pružaju očigledne zdravstvene prednosti, proporcije makronutrijenata koje pružaju takve dijete generalno se smatraju neskladnim sa prihvatljivim rasponom makronutrijenata (14).

Procenti raspodele ugljenih hidrata, proteina i masti na našem tanjiru dobro su poznati onima koji teže zdravom ponašanju u ishrani. Svaki od tri makronutrijenta ima važnu ulogu u našem telu, bilo u proizvodnji energije ili kao gradivni blok, a postoji kompleksno međusobno preplitanje omogućavajući metabolitima jednog da uđu u metabolički ciklus kojim dominira drugi (15).

MIKRONUTRIJENTI

Nedostatak mikronutrijenata, poznat i kao „skrivena glad“, proizlazi iz nedostatka adekvatnih vitamina i minerala u redovnoj ishrani. Karakterističan za ovakvu ishranu je visok unos osnovnih namirnica i žitarica, ali nizak unos hrane bogate bioraspoloživim mikronutrijentima, kao što su voće, povrće, životinjski i morski proizvodi, što rezultira nedostatkom raznovrsnosti u ishrani. Nedostaci mikronutrijenata imaju značajan uticaj na javno zdravlje, pogađajući milijarde ljudi širom sveta (4).

Prema procenama Svetske zdravstvene organizacije (SZO), oko 190.000.000 dece mlađe od pet godina (33,3% populacije predškolskog uzrasta) pati od nedostatka vitamina A, a približno 5.200.000 ima noćno slepilo (16). Odojčad i mala deca imaju povećane potrebe za vitaminom A kako bi podržali brz rast i otpornost na infekcije. Teški nedostatak vitamina A u ovoj grupi može izazvati oštećenje vida, anemiju i oslabljen imunološki sistem, povećavajući rizik od morbila ili dijareje, što dalje dovodi do povećanog rizika od morbiditeta i smrtnosti (17).

Anemija uzrokovana nedostatkom gvožđa predstavlja najčešći poremećaj mikronutrijenata širom sveta, negativno utičući na zdravlje i socio-ekonomsko blagostanje miliona muškaraca, žena i dece. Ovaj problem često postaje ozbiljniji zbog ograničenog pristupa odgovarajućoj zdravstvenoj zaštiti i lečenju. Nedostatak gvožđa proizlazi iz dugotrajnog negativnog balansa, što rezultira smanjenim ili iscrpljenim zalihama gvožđa. Gvožđe, ključna komponenta svake žive ćelije, igra suštinsku ulogu u brojnim biohemijskim reakcijama u telu, povezan je s transportom i skladištenjem kiseonika, proizvodnjom energije, sintezom DNK i transportom elektrona.

Posledice ovog nedostatka su ozbiljne: usporavanje rasta, poremećeni kognitivni razvoj, slabe mentalne i motoričke performanse, smanjen radni kapacitet i opšte smanjenje kvaliteta života. Prevencija i kontrola obično se postižu obogaćivanjem osnovnih namirnica, kao što su brašno, pirinač i testenina, gvoždem i/ili primenom dodataka gvožđa, često u obliku tableta gvožđa. Iako su suplementi gvožđa široko dostupni i obogaćena hrana predstavlja glavnu komponentu ishrane u razvijenom svetu, pristup je ograničen u zemljama u razvoju, a cena često predstavlja prepreku (18).

Dojenčad i deca mlađa od pet godina su podložni riziku od razvoja anemije zbog nedostatka gvožđa, što proizlazi iz povećanih potreba za brzim rastom i ishrane koja često ne obezbeđuje i dovoljno dobro apsorbuje gvožđe (19). Nedostatak gvožđa, bilo da prati anemiju ili ne, može imati ozbiljne zdravstvene posledice za malu decu, uključujući povećan perinatalni mortalitet, odložen mentalni i fizički razvoj, negativne posledice u ponašanju, smanjenu slušnu i vizuelnu funkciju, kao i narušenu fizičku sposobnost (20). Neki od negativnih efekata nedostatka gvožđa tokom ranog detinjstva su nepovratni i mogu rezultirati lošim uspehom u školi, smanjenim fizičkim radnim kapacitetom i umanjenom produktivnošću kasnije u životu (21).

Termin „poremećaj nedostatka joda“ odnosi se na kompleksne efekte koji proizlaže iz nedovoljnog unosa joda. Planinska područja sveta često su sklona nedostatku joda jer kiša izvlači ovaj mineral iz stena i tla. Područja s velikim nedostatkom obuhvataju Himalaje, Ande, Evropske Alpe i ogromne planinske regije Kine. Takođe se često pojavljuje u poplavljenim rečnim dolinama istočne Indije, Bangladeša i Burme (4). Jod se lako apsorbuje iz ishrane i neophodan je za sintezu tiroidnih hormona, koji su ključni za normalan rast i razvoj. Inicijative javnog zdravlja za korekciju nedostatka joda često uključuju jodiranje soli, što je bila najčešća i najefikasnija metoda. Ova praksa je značajno smanjila prevalenciju poremećaja nedostatka joda u zemljama poput Švajcarske, Sjedinjenih Američkih Država i Novog Zelanda. Od prvog uspešnog uvođenja tokom 1920-ih u Švajcarskoj, slični programi su se pokazali uspešnim i u Centralnoj i Južnoj Americi, Evropi i Aziji (22).

Nedostatak cinka proizlazi iz nedovoljnog unosa ili apsorpcije cinka iz ishrane. Povećani gubitak cinka tokom epizoda dijareje takođe doprinosi nedostatku. Sastav ishrane može uticati na bioraspoloživost cinka, jer visoki nivoi fitata u ishrani mogu dovesti do loše apsorpcije, dok hrana životinjskog porekla povećava dostupnost. Širom sveta, nedostatak cinka odgovoran je za otprilike 16% infekcija donjih disajnih puteva, 18% malarije, 10% dijareje i 1,4% smrtnih slučajeva (4).

Folat omogućava deobu ćelija i rast tkiva. Adekvatna količina folata u ishrani pomaže u sprečavanju malformacija koje utiču na nervnu cev i kičmenu moždinu, kao što su anencefalija i spina bifida, kao i urođene mane, kao što su rasep usne i nepca. Bez adekvatne folne kiseline u ishrani, dve od svakih 1.000 trudnoća mogu završiti sa ozbiljnim urođenim defektom. Nedostatak folata takođe je povezan sa povećanim rizikom od prevremenog porođaja, niske telesne mase na rođenju i može doprineti anemiji, posebno kod trudnica i dojilja (23).

DIJETOPROFILAKSA

Brzo rastući teret hroničnih bolesti predstavlja ključnu determinantu globalnog javnog zdravlja. Već 79% smrtnih slučajeva koji se mogu pripisati hroničnim bolestima dešava se u zemljama u razvoju, uglavnom među muškarcima srednjih godina (24). Sve više dokaza ukazuje na to da rizici od hroničnih bolesti počinju u fetalnom životu i nastavljaju se do starosti (25). Hronične bolesti kod odraslih, stoga, odražavaju kumulativnu različitu životnu izloženost štetnom fizičkom i društvenom okruženju. Sve je više dokaza koji povezuju dojenje sa značajno nižim nivoom krvnog pritiska u detinjstvu kod terminske dece i nedonoščadi (26).

Predložena je hipoteza da ishrana bogata holesterolom u ranom životu može imati ulogu u regulaciji metabolizma holesterola i lipoproteina u kasnijem životu (27) primarily in the form of dietary sugars is significantly associated with increased dental caries risk. Malnutrition (under or over nutrition. Međutim, utvrđivanje po-

stojanja nezavisnog efekta težine u detinjstvu može biti izazovno, s obzirom na to da se prekomerna težina u tom periodu često održava i tokom odraslog doba. U jednoj retrospektivnoj kohortnoj studiji, relativna težina u adolescenciji značajno je bila povezana sa povećanim rizikom od raka debelog creva (28).

Povećana prevalencija povišenog krvnog pritiska uočena je ne samo kod odraslih osoba niskog socioekonomskog statusa, već i kod dece. Važno je napomenuti da ovo poslednje nije uvek povezano sa kasnijim povećanjem krvnog pritiska (29). Ipak, istraživanja ukazuju na to da se krvni pritisak može pratiti od detinjstva, kako bi se predvidela eventualna pojava hipertenzije u odraslom dobu (30). Prisustvo i praćenje visokog krvnog pritiska kod dece i adolescenata često su rezultat nezdravog načina života. To uključuje prekomerni unos ukupnih i zasićenih masti, holesterola i soli, nedovoljan unos kalijuma, te smanjenu fizičku aktivnost, često praćenu sedentarnim stilom života (29).

U adolescenciji, upotreba alkohola i duvana doprinosi povećanju krvnog pritiska. Tri ključna aspekta adolescencije značajno utiču na razvoj hroničnih bolesti: prvo, razvoj faktora rizika tokom ovog perioda; drugo, praćenje faktora rizika tokom celog života; i treće, u kontekstu prevencije, razvoj zdravih ili nezdravih navika koje imaju tendenciju da se zadrže tokom celog života, kao što je, na primer, fizička neaktivnost (31).

Tri ključna pitanja koja se odnose na odraslo doba identifikovana su kako bi se bolje razumela dinamika hroničnih bolesti. Prvo, u kojoj meri faktori rizika i dalje ostaju značajni u razvoju hroničnih bolesti? Drugo, u kojoj meri će modifikacija ovih faktora rizika uticati na pojavu bolesti? I treće, kakva je uloga smanjenja i modifikacije faktora rizika u sekundarnoj prevenciji i lečenju obolelih? Najčvršće veze između kardiovaskularnih bolesti ili dijabetesa javljaju se između tih bolesti i ključnih poznatih faktora rizika kod odraslih. Ti faktori uključuju upotrebu duvana, gojaznost, fizičku neaktivnost, povišen nivo holesterola, visok krvni pritisak i upotrebu alkohola. Razumevanje i efikasno suočavanje s ovim faktorima rizika igra ključnu ulogu u prevenciji i lečenju hroničnih bolesti u odraslom dobu (32).

DIJETOTERAPIJA

Novе dijetetske strategije za lečenje prekomerne težine i gojaznosti su se pojavile i postale popularne, ali često su zasnovane na ličnim iskustvima i izveštajima, umesto na čvrstim naučnim dokazima. Kako bi se dobila efikasna strategija za gubitak težine, istraživanja na životinjskim modelima i kliničkim ispitivanjima na ljudima sprovedena su kako bi se proučile promene u sastavu tela i metaboličkim ishodbima. Važno je napomenuti da uspešan gubitak težine i održavanje zahteva promene u životnom stilu, uključujući dijetu koja smanjuje unos energije, poboljšava kvalitet ishrane i povećava fizičku aktivnost (33).

Akademija za ishranu preporučuje pristup koji se fokusira na promenu životnog stila kako bi se postigao uspešan gubitak težine (34). Ovo uključuje dijetu koja smanjuje unos kalorija i poboljšava kvalitet ishrane, uz istovremeno povećanje nivoa fizičke aktivnosti (33). Važno je naglasiti da pristupi lečenju prekomerne težine mogu varirati, a neki od njih uključuju kognitivno-bihevioralnu terapiju, farmakoterapiju i barijatrijsku hirurgiju, s tim da se svaki pojedinačan slučaj treba analizirati i prilagoditi. Kada je reč o dijetetskim intervencijama za mršavljenje, ključno je prilagoditi ishranu pojedincu kako bi se postigao negativan energetske bilans. Dijete se često oslanjaju na uključivanje ili isključivanje određenih namirnica ili grupa namirnica. Postoje tri glavne kategorije dijeta: one koje manipulišu sadržajem makronutrijenata (niskom masti, visokim proteinima, niskim ugljenim hidratima), one koje ograničavaju specifične namirnice/grupe namirnica (bez glutena, paleo dijeta, vegetarijanska/veganska, mediteranska) i one koje manipulišu vremenom (post) (33).

DIJETETSKI SUPLEMENTI

Osnovni izazov u bilo kojoj raspravi o regulaciji dijetetskih suplemenata leži u nedostatku globalnog konsenzusa o definiciji kategorija proizvoda, kao što su dijetetski suplementi, prirodni zdravstveni proizvodi, komplementarni lekovi ili suplementi ishrani, što varira od zemlje do zemlje. Drugi izazov je taj što, iako postoji opšte nastojanje da se zaštite potrošači od potencijalne štete, regulatorni sistemi su različiti u svakoj zemlji, pa čak i u onima sa sličnim kulturama, pravnim sistemima i nivoima ekonomskog razvoja. Konačni izazov je prisutan u činjenici da su dijetetski suplementi često predmet emotivnih i polarizovanih rasprava. Postoji širok spektar mišljenja i gledišta, pri čemu neki smatraju da ovi proizvodi treba da budu podvrgnuti istim standardima kao i konvencionalni lekovi i hrana, dok drugi veruju da je neophodan prilagođen pristup zbog često prisutne tradicionalne ili istorijske osnove dokaza, kao i višeg sastojka prisutnog u ovim proizvodima. Važno je naglasiti da, i pored sličnosti u kulturama i pravnim sistemima, zdravstveni proizvodi sa dodatkom ishrane podležu različitim pravilima i propisima širom sveta. Bez globalnog konsenzusa o terminologiji i regulaciji, ova pitanja ostaju izazovna i zahtevaju pažljivo razmatranje kako bi se postigao balans između zaštite potrošača i podrške raznolikosti proizvoda (35).

U idealnim okolnostima, medicinske preporuke za lekove ili dodatke trebalo bi da se baziraju na rigoroznim studijama. Većina istraživanja koja uključuju dijetetske suplemente često nije dvostruko slepa i placebo kontrolisana. Ipak, lekari ne bi trebalo da automatski odbacuju dodatke ishrani samo zbog toga. Važno je uzeti u obzir veliko i validno kliničko iskustvo sa dodacima ishrane, koje obuhvata stotine miliona ljudi tokom vekova i različitih kultura.

Uprkos nedostatku idealnih studija, dostupne informacije o mnogim popularnim dijetetskim suplementima omogućavaju razumne preporuke za njihovu upotrebu.

Važno je naglasiti da je individualni odgovor na suplemente različit, i da bi se pre upotrebe bilo kog dodatka ishrani, posebno u medicinske svrhe, trebalo konsultovati sa stručnjakom. Kontinuirano praćenje istraživanja i napretka u oblasti dodataka ishrani doprinosi boljem razumevanju njihovih efekata i bezbednosti (35).

PREVENCIJA BOLESTI

Vodeći faktor rizika za DALY globalno u 2019. bila je pothranjenost dece i majki, koja u velikoj meri utiče na zdravlje u najmlađim starosnim grupama i čini 295.000.000 (253–350) DALY (11,6% [10·3–13·1] svih globalnih DALY te godine). Opterećenje faktorima rizika značajno je variralo u 2019. između starosnih grupa i lokacija. Među decom uzrasta od 0 do 9 godina, tri vodeća faktora rizika za DALY bila su povezana sa neuhranjenošću (11).

Kvantitativne i kvalitativne promene u našim obrascima ishrane koje dovode do dramatičnih promena u očekivanom životnom veku rezultiraju problemima hroničnih bolesti povezanih sa ishranom. Hronične bolesti povezane sa ishranom se obično javljaju u srednjem i kasnijem odraslom dobu i mogu, povećanjem incidencije prerane smrtnosti, usporiti povećanje očekivanog životnog veka. Što je još važnije, dovode do morbiditeta i rezultirajućih izgubljenih godina života prilagođenih invalidnosti (DALY) i doprinose ekonomskim gubicima i smanjenju kvaliteta života (4).

Strategije za unapređenje statusa ishrane i rasta kod dece moraju biti sveobuhvatne i uključivati intervencije koje podržavaju trudnice i dojilje. Rano započinjanje dojenja, koje se preporučuje tokom prvih šest meseci života, treba da bude promovisano, uz održavanje dojenja, uz dodatak adekvatne dopunske ishrane do druge godine života. Suplementacija mikronutrijentima treba se primenjivati kad god je to potrebno.

Preporuke Svetske zdravstvene organizacije (SZO) iz 1999. godine, u partnerstvu sa UNICEF-om i BASICS-om, sadrže efikasne, izvodljive i pristupačne intervencije (36). Ove intervencije su najefikasnije kada se kombinuju sa merama za smanjenje infekcija, što dodatno ukazuje na važnost holističkog pristupa.

Fokus na esencijalnim merama ishrane može značajno doprineti smanjenju smrtnosti među novorođenčadi i decom, unapređenju fizičkog i mentalnog rasta i razvoja, kao i poboljšanju ukupne produktivnosti. Ove ključne akcije podrazumevaju:

- naglašava se značaj isključivog dojenja tokom prvih šest meseci života;
- adekvatno dopunsko hranjenje, počevši od šest meseci, uz nastavak dojenja tokom dve godine;
- pravilna ishrana bolesne i neuhranjene dece;
- adekvatan unos vitamina A za žene i decu;
- adekvatan unos gvožđa za žene i decu; i
- adekvatan unos joda kod svih članova domaćinstva.

Unapređenje ishrane zahteva zajedničke napore na nivou zdravstvenih ustanova i šire zajednice, uključujući praćenje ishrane, identifikaciju rizičnih subpopulacija, ažuriranje politika i protokola, kao i obezbeđivanje resursa za sprovođenje ishrane u praksi.

ZAKLJUČAK

U ovom radu smo detaljno istražili i analizirali kompleksnu temu ishrane, fokusirajući se na ključne aspekte kao što su makro- i mikronutrijenti, nedostatak gvožđa, anemija, problemi u ishrani dece, nedostatak joda, te uloga dijetetskih suplemenata. Prikazali smo sveobuhvatnu sliku izazova s kojima se susreće globalno zdravlje u vezi sa ishranom i njenim uticajem na različite segmente društva.

Glad, posebno nesigurnost hrane u domaćinstvu, predstavlja ključnu odrednicu siromaštva u društvima i značajan izazov za globalno zdravlje. Pristup zdravoj, pristupačnoj hrani i kvalitetnoj ishrani trebalo bi da bude univerzalno pravo svake osobe. Međutim, postojeće nepravde u sistemima i procesima strukturiraju svakodnevne uslove života, stvarajući duboke nejednakosti u pristupu ishrani.

U 2021. godini, između 720.000.000 i 811.000.000 ljudi suočilo se s glađu širom sveta, naglašavajući hitnost transformacije sistema ishrane za postizanje sigurnosti hrane, poboljšane ishrane i pristupačne zdrave ishrane za sve. Zdrava ishrana ima ključnu ulogu ne samo u rešavanju gladi već i u povećanju održivosti sistema ishrane.

Neuhranjenost, u svim svojim oblicima, usko je povezana s glavnim uzrocima smrti i invaliditeta širom sveta. Ishrana je jedna od ključnih determinanti varijacija u stopama bolesti, direktno ili indirektno utičući na zdravlje ljudi. U zemljama u razvoju suočavamo se s dvostrukim teretom – pothranjenost koegzistira s porastom hroničnih bolesti povezanih s ishranom.

Borba protiv neuhranjenosti zahteva sveobuhvatni pristup, koji uključuje političku posvećenost, međusektorske akcije i značajna ulaganja u sisteme podataka za praćenje i evaluaciju. Povezivanje optimalne ishrane s razvojem prevazilazi tradicionalne zdravstvene intervencije, stvarajući put prema unapređenju zdravlja populacije. Ovaj holistički pristup ključan je za postizanje globalnih ciljeva u borbi protiv neuhranjenosti i unapređenja kvaliteta života širom sveta.

LITERATURA

1. Remington PL, Brownson RC, Wegner MV, editors. Chronic Disease Epidemiology, Prevention, and Control, 4th edition [Internet]. American Public Health Association; 2016 [cited 2024 Jan 19]. Available from: <http://ajph.aphapublications.org/doi/book/10.2105/9780875532783>

2. WHO. Noncommunicable diseases: progress monitor 2020 [Internet]. 2020 [cited 2024 Jan 27]. Available from: <https://www.who.int/westernpacific/health-topics/noncommunicable-diseases>
3. Essential nutrition actions: improving maternal, newborn, infant and young child health and nutrition [Internet]. [cited 2024 Jan 21]. Available from: <https://www.who.int/publications-detail-redirect/9789241505550>
4. Oxford Textbook of Global Public Health [Internet]. Oxford Textbook of Global Public Health. Oxford University Press; [cited 2024 Jan 19]. Available from: <https://oxfordmedicine.com/view/10.1093/med/9780199661756.001.0001/med-9780199661756>
5. Shetty P. Achieving the goal of halving global hunger by 2015. *Proceedings of the Nutrition Society*. 2006; 65(1): 7–18.
6. Shetty P. Nutrition sensitive agriculture to achieve better nutritional outcomes. *Eur J Clin Nutr*. 2018; 72(9): 1296–9.
7. Women: the key to food security | IFPRI: International Food Policy Research Institute [Internet]. [cited 2024 Jan 21]. Available from: <https://www.ifpri.org/publication/women-key-food-security>
8. IUFoST | Strengthening Global Food Science and Technology for Humanity [Internet]. [cited 2024 Jan 21]. Available from: <https://www.iufost.org/>
9. Neufingerl N, Eilander A. Nutrient Intake and Status in Adults Consuming Plant-Based Diets Compared to Meat-Eaters: A Systematic Review. *Nutrients*. 2021; 14(1): 29.
10. Micha R, Mannar V, Afshin A, Allemandi L, Baker P, Battersby J, et al. 2020 Global nutrition report: action on equity to end malnutrition [Internet]. Bristol, UK: Development Initiatives; 2020 [cited 2024 Jan 21]. Available from: <https://globalnutritionreport.org/reports/2020-global-nutrition-report/>
11. GBD 2019 Risk Factors Collaborators. Global burden of 87 risk factors in 204 countries and territories, 1990-2019: a systematic analysis for the Global Burden of Disease Study 2019. *Lancet*. 2020; 396(10258): 1223–49.
12. Hall KD, Guo J. Obesity Energetics: Body Weight Regulation and the Effects of Diet Composition. *Gastroenterology*. 2017; 152(7): 1718–1727.e3.
13. Venn BJ. Macronutrients and Human Health for the 21st Century. *Nutrients*. 2020; 12(8): E2363.
14. Pajic P, Pavlidis P, Dean K, Neznanova L, Romano R-A, Garneau D, et al. Independent amylase gene copy number bursts correlate with dietary preferences in mammals. *Elife*. 2019; 8: e44628.
15. Nassar MF. The macronutrients' interplay. *Clinical Nutrition*. 2019; 38(6): 2943–4.
16. World Health Organization. Global prevalence of vitamin A deficiency in populations at risk 1995–2005: WHO global database on vitamin A deficiency [Internet]. World Health Organization; 2009 [cited 2024 Jan 20]. Available from: <https://apps.who.int/iris/handle/10665/44110>
17. Sommer A, West, Jr KP, Olson JA, Ross AC. Vitamin A Deficiency: Health, Survival and Vision. Oxford, New York: Oxford University Press; 1996. 452 p.

18. Maddock J. Public Health - Methodology, Environmental and Systems Issues [Internet]. 2012 [cited 2024 Jan 19]. Available from: <https://www.intechopen.com/books/2289>
19. Dewey KG, Brown KH. Update on technical issues concerning complementary feeding of young children in developing countries and implications for intervention programs. *Food Nutr Bull.* 2003; 24(1): 5–28.
20. Algarín C, Peirano P, Garrido M, Pizarro F, Lozoff B. Iron deficiency anemia in infancy: long-lasting effects on auditory and visual system functioning. *Pediatr Res.* 2003; 53(2): 217–23.
21. Iannotti LL, Tielsch JM, Black MM, Black RE. Iron supplementation in early childhood: health benefits and risks. *Am J Clin Nutr.* 2006; 84(6): 1261–76.
22. Bürgi H, Supersaxo Z, Selz B. Iodine deficiency diseases in Switzerland one hundred years after Theodor Kocher's survey: a historical review with some new goitre prevalence data. *Acta Endocrinol (Copenh).* 1990; 123(6): 577–90.
23. Api O, Breyman C, Çetiner M, Demir C, Eceder T. Diagnosis and treatment of iron deficiency anemia during pregnancy and the postpartum period: Iron deficiency anemia working group consensus report. *Turk J Obstet Gynecol.* 2015; 12(3): 173–81.
24. M K, J S, M NN, G B, J M, J N, et al. Adult Dental Health Survey.: Oral Health in the United Kingdom. 2000 [cited 2024 Jan 21]; Available from: [https://kclpure.kcl.ac.uk/portal/en/publications/adult-dental-health-survey\(842e2e9d-a85b-441c-b70d-8339e4e95742\)/export.html](https://kclpure.kcl.ac.uk/portal/en/publications/adult-dental-health-survey(842e2e9d-a85b-441c-b70d-8339e4e95742)/export.html)
25. Joshipura KJ, Willett WC, Douglass CW. The impact of edentulousness on food and nutrient intake. *J Am Dent Assoc.* 1996; 127(4): 459–67.
26. Okoye L, Ekwueme O. Prevalence of Dental Caries in a Nigerian Rural Community: A Preliminary Local Survey. *Ann Med Health Sci Res.* 2011; 1(2): 187–95.
27. Mobley C, Marshall TA, Milgrom P, Coldwell SE. The Contribution of Dietary Factors to Dental Caries and Disparities in Caries. *Acad Pediatr.* 2009; 9(6): 410–4.
28. Petersen PE, Hoerup N, Poomviset N, Prommajan J, Watanapa A. Oral health status and oral health behaviour of urban and rural schoolchildren in Southern Thailand. *Int Dent J.* 2001; 51(2): 95–102.
29. Poulsen S, Malling Pedersen M. Dental caries in Danish children: 1988-2001. *Eur J Paediatr Dent.* 2002; 3(4): 195–8.
30. Kalsbeek H, Verrips GH. Consumption of sweet snacks and caries experience of primary school children. *Caries Res.* 1994; 28(6): 477–83.
31. Mikx FHM, Hoeven JS van der, Plasschaert AJM, König KG. Effect of *Actinomyces viscosus* on the Establishment and Symbiosis of *Streptococcus mutans* and *Streptococcus sanguis* in SPF Rats on Different Sucrose Diets. *CRE.* 1975; 9(1): 1–20.
32. Cole-Hamilton I, Gunner K, Leverkus C, Starr J. A study among dietitians and adult members of their households of the practicalities and implications of following proposed dietary guidelines for the UK. British Dietetic Association Community Nutrition Group Nutrition Guidelines Project. *Hum Nutr Appl Nutr.* 1986; 40(5): 365–89.
33. Freire R. Scientific evidence of diets for weight loss: Different macronutrient composition, intermittent fasting, and popular diets. *Nutrition.* 2020; 69: 110549.

34. Raynor HA, Champagne CM. Position of the Academy of Nutrition and Dietetics: Interventions for the Treatment of Overweight and Obesity in Adults. *J Acad Nutr Diet.* 2016; 116(1): 129–47.
35. Massey PB. Dietary supplements. *Medical Clinics of North America.* 2002; 86(1): 127–47.
36. Essential nutrition actions: mainstreaming nutrition through the life-course [Internet]. [cited 2024 Jan 20]. Available from: <https://www.who.int/publications-detail-redirect/9789241515856>

Jelena Vulović¹, Snežana Knežević², Olivera Petrović³,
Miroslav Radulović³, Anđelka Dugalić³

NUTRITION AND GLOBAL FOOD SECURITY FOR HEALTH PRESERVATION

Abstract: Every individual deserves access to healthy, affordable, and quality nutrition. Such access is hindered by deep inequalities stemming from unjust systems that structure everyday living conditions. The transformation of the food system into safe, improved, and healthy nutrition accessible to all is a crucial global issue. Healthy nutrition can play a significant role in the sustainability of the food system. Childhood obesity is a significant health problem in the developed world and affects many countries with low and middle incomes, particularly in urban areas. Unfortunately, obese children often remain obese in adulthood, increasing the likelihood of developing numerous chronic non-communicable diseases at a younger age. There is a clear link between infant and young child feeding practices and the socio-demographic characteristics of households. Breastfeeding up to the age of one is less common in wealthier households, urban environments, or among highly educated mothers. Combating malnutrition requires political dedication and simultaneous actions across multiple sectors, along with significant investments in program implementation and monitoring progress towards sustainable healthy nutrition.

Key words: Nutrition, nutrients, health, disease

INTRODUCTION

Healthy eating habits are essential for maintaining health and well-being, while people often consume more food than necessary for survival. Food is deeply intertwined with culture, memories, lifestyle, and emotions. Families, schools, and employers shape social norms through policies and environments that can either

¹ General Hospital Paraćin, Department of Anesthesiology and Reanimation, Paraćin, Serbia

² The Academy of Applied Technical Studies Belgrade, Department of Medical Studies, Belgrade, Serbia, E-mail: lesta59@yahoo.com

³ Health Center Kraljevo, Serbia

support or hinder healthy eating habits. In contrast, the food and beverage industry influences choices and consumption through marketing strategies, portion sizes, food composition, nutrition information, store locations, restaurant offerings, and pricing (1). The entertainment and sports industry also plays a role in promoting, making available, and placing healthy food in sports, film, and other entertainment spaces. Poor nutrition has numerous consequences, linked to most chronic non-communicable diseases, including obesity, type 2 diabetes, cardiovascular diseases, hypertension, poor oral health, osteoporosis, iron-deficiency anemia, and various types of cancer (2).

Malnutrition in all its forms is closely linked, either directly or indirectly, to the leading causes of death and disability worldwide. This situation encompasses perinatal and infectious diseases, as well as chronic conditions (3). Ecological variations in disease rates include nutrition as one of the primary determinants. In the developing world, numerous nutrient-deficiency diseases persist and now coexist with the increasing incidence of nutrition-related chronic diseases. Developing societies bear a double burden of malnutrition with the emergence of so-called diseases of affluence amid persistent undernutrition in their populations (4).

In this paper, we focus on analyzing key challenges related to nutrition globally, to gain a deeper understanding of its impact on health and identify strategies to improve nutrition and prevent diseases.

HEALTH SAFETY OF FOOD

Achieving household food security requires the adequate provision of food for all members of the household, ensuring supply stability throughout the year, and emphasizing the importance of the right to produce and procure food. Food insecurity can stem from the unavailability of food, inadequate purchasing power, or improper food utilization at the household or individual level (4). This is a complex phenomenon attributed to a range of factors that vary in importance depending on the region, countries, and social groups, as well as over time (5). It is described in terms of the availability and stability of high-quality food, as well as access to food and its utilization.

All these criteria must be met to achieve the consumption of a healthy diet and attain nutritional well-being (6). The focus on nutrition encompasses the physiological requirements for various nutrients, determinants of their bioavailability and utilization, as well as aspects of care, healthcare services, and a healthy environment that impacts it. Food security can be defined as an adequate nutritional status in terms of protein, energy, vitamins, and minerals for all household members at all times (7). While this definition illustrates consideration for the need for food to ensure optimal nutrient supply, i.e., physiological needs, other definitions of food safety direct attention to vulnerable individuals and their needs related to non-nutritional factors.

Emphasizing the need for a paradigm shift in formulating food security policies at the individual level, Swaminathan (2008) defines food security as a physical, economic, and social approach to balanced nutrition, safe drinking water, environmental hygiene, primary healthcare, and basic education (8).

Food safety refers to whether food is safe for human consumption and does not contain biological and chemical contaminants that can cause illness. Growing concerns about food safety in the West present a paradox, as epidemiological evidence on food safety is quite contrary to the public and media perception that the currently available food is less safe than it used to be. Improvements in public health have practically eradicated predominantly foodborne infections that were previously associated with morbidity and mortality. Common diseases currently encountered in the West are usually linked to mild, self-limiting gastroenteritis. Risk perception studies suggest that the public becomes alarmed about health threats that are disproportionate to the actual disease-related risk, and this public concern is fueled by media turning health issues into health scares depending on the reporting of individual incidents (4).

BALANCED NUTRIENT INTAKE

Health professionals increasingly recommend a plant-based diet, enriched with fruits, vegetables, legumes, whole grains, and nuts, with a limited intake of red meat and moderate amounts of dairy products, eggs, poultry, and fish, which is beneficial for health and the environment (9). However, the current dietary system is not sustainable as global food production jeopardizes climate stability and ecosystem resilience. Additionally, a large portion of the global population suffers from malnutrition, with one in nine people undernourished or hungry, one in three people obese, and an estimated 2 billion people experiencing micronutrient deficiencies (10).

Unhealthy diets are a major cause of malnutrition, and both factors rank among the top ten risk factors contributing to the global burden of disease (11). Changes in body weight accompany the imbalance between calorie intake and expenditure. This fact is often misinterpreted, suggesting that obesity is caused by overeating and lack of physical activity and can be treated with simple advice to reduce food intake and increase physical activity. Different components of the energy balance are dynamically interconnected, and weight loss opposes physiological processes (12).

MACRONUTRIENTS

Macronutrients – fats, proteins, and carbohydrates - provide energy and essential components necessary for maintaining life. Fat consists of glycerol and fatty acids, proteins are composed of amino acids, while carbohydrates are simple sugars

occurring as monosaccharides or chains of linked monosaccharides (such as starch), which hydrolyze in the human small intestine into monosaccharides or are resistant to hydrolysis (such as dietary fibers). The combination of these macronutrients is essential for longevity and health, although it is not definitively established that there is an optimal combination that would provide the best health benefits. Throughout history, the human population has survived on diets with different proportions of these macronutrients (13). From an evolutionary perspective, humans are well adapted to digest starch. Although diets high in starch content, based on root vegetables, legumes, and whole grains, offer obvious health benefits, the macronutrient proportions provided by such diets are generally considered inconsistent with an acceptable range of macronutrients (14).

The percentage distribution of carbohydrates, proteins, and fats on our plates is well-known to those who strive for healthy eating behaviors. Each of the three macronutrients plays an important role in our body, either in energy production or as a building block, and there is a complex interplay allowing metabolites of one to enter the metabolic cycle dominated by another (15).

MICRONUTRIENTS

Micronutrient deficiency, also known as ‘hidden hunger’, results from the lack of adequate vitamins and minerals in a regular diet. The characteristic of such a diet is a high intake of staple foods and cereals, but a low intake of foods rich in bioavailable micronutrients, such as fruits, vegetables, animal, and marine products, resulting in a lack of diversity in nutrition. Micronutrient deficiencies have a significant impact on public health, affecting billions of people worldwide (4).

According to estimates from the World Health Organization (WHO), around 190 million children under the age of five (33.3% of the preschool-age population) suffer from vitamin A deficiency, with approximately 5.2 million experiencing night blindness (16). Infants and young children have increased needs for vitamin A to support rapid growth and immunity. Severe vitamin A deficiency in this group can lead to vision impairment, anemia, and weakened immune systems, increasing the risk of measles or diarrhea, and further contributing to an elevated risk of morbidity and mortality (17).

Anemia caused by iron deficiency represents the most common micronutrient disorder worldwide, negatively impacting the health and socio-economic well-being of millions of men, women, and children. This problem often becomes more severe due to limited access to appropriate healthcare and treatment. Iron deficiency arises from a prolonged negative balance, resulting in reduced or depleted iron stores. Iron, a crucial component of every living cell, plays a fundamental role in numerous biochemical reactions in the body. It is linked to the transport and storage of oxygen, energy production, DNA synthesis, and electron transport.

The consequences of this deficiency are severe: stunted growth, impaired cognitive development, weak mental and motor performance, reduced work capacity, and an overall decrease in the quality of life. Prevention and control are typically achieved through fortifying staple foods, such as flour, rice, and pasta, with iron and/or the use of iron supplements, often in the form of iron tablets. While iron supplements are widely available, and fortified food is a key component of the diet in the developed world, access is limited in developing countries, and cost often serves as a barrier (18).

Infants and children under the age of five are susceptible to the risk of developing iron deficiency anemia, stemming from increased needs for rapid growth and a diet that often fails to provide iron in a well-absorbed form (19). Iron deficiency, whether accompanying anemia or not, can have serious health consequences for young children, including increased perinatal mortality, delayed mental and physical development, adverse behavioral outcomes, reduced hearing and visual function, as well as impaired physical capacity (20). Some of the negative effects of iron deficiency during early childhood are irreversible and may result in poor academic performance, diminished physical work capacity, and reduced productivity later in life (21).

The term 'iodine deficiency disorder' refers to the complex effects arising from insufficient iodine intake. Mountainous regions of the world are often prone to iodine deficiency as rain leaches this mineral from rocks and soil. Areas with significant deficiency include the Himalayas, Andes, European Alps, and vast mountainous regions of China. It also frequently occurs in the flooded river valleys of Eastern India, Bangladesh, and Burma (4). Iodine is easily absorbed from the diet and is necessary for the synthesis of thyroid hormones crucial for normal growth and development. Public health initiatives to correct iodine deficiency often involve iodizing salt, which has been the most common and effective method. This practice has significantly reduced the prevalence of iodine deficiency disorders in countries such as Switzerland, the United States, and New Zealand. Since its successful introduction in the 1920s in Switzerland, similar programs have proven successful in Central and South America, Europe, and Asia (22).

Zinc deficiency results from inadequate intake or absorption of zinc from the diet. Increased zinc loss during episodes of diarrhea also contributes to the deficiency. The composition of the diet can affect zinc bioavailability, as high levels of phytates in the diet can lead to poor absorption, while animal-based foods increase availability. Worldwide, zinc deficiency is responsible for approximately 16% of lower respiratory tract infections, 18% of malaria, 10% of diarrhea, and 1.4% of deaths (4).

Folate enables cell division and tissue growth. An adequate amount of folate in the diet helps prevent malformations affecting the neural tube and spinal cord, such as anencephaly and spina bifida, as well as congenital defects like cleft lip and palate. Without sufficient folic acid in the diet, two out of every 1000 pregnancies may result in a serious congenital defect. Folate deficiency is also associated with an increased

risk of premature birth, and low birth weight, and can contribute to anemia, especially in pregnant and lactating women (23).

DIETARY PREVENTION

The rapidly growing burden of chronic diseases represents a key determinant of global public health. Already, 79% of deaths attributed to chronic diseases occur in developing countries, mainly among middle-aged men (24). Increasing evidence suggests that the risks of chronic diseases begin in fetal life and continue into old age (25). Chronic diseases in adults, therefore, reflect cumulative diverse life exposures to harmful physical and social environments. There is growing evidence linking breastfeeding to significantly lower blood pressure levels in childhood in term infants and preterm infants (26).

A hypothesis has been proposed that a cholesterol-rich diet in early life may play a role in regulating cholesterol and lipoprotein metabolism in later life (27). However, establishing the existence of an independent effect of childhood weight can be challenging, considering that excess weight during this period is often maintained into adulthood. In a retrospective cohort study, relative weight in adolescence was significantly associated with an increased risk of colorectal cancer (28).

Increased prevalence of elevated blood pressure has been observed not only in adults with low socioeconomic status but also in children. It is important to note that the latter is not always associated with later increases in blood pressure (29). However, research indicates that blood pressure can be tracked from childhood to predict the potential development of hypertension in adulthood (30). The presence and monitoring of high blood pressure in children and adolescents are often the result of an unhealthy lifestyle. This includes excessive intake of total and saturated fats, cholesterol, and salt, inadequate potassium intake, and reduced physical activity, often accompanied by a sedentary lifestyle (29).

In adolescence, the use of alcohol and tobacco contributes to increased blood pressure. Three key aspects of adolescence significantly influence the development of chronic diseases: first, the development of risk factors during this period; second, the tracking of risk factors throughout life; and third, in the context of prevention, the development of healthy or unhealthy habits that tend to persist throughout life, such as physical inactivity (31).

Three key questions related to adulthood have been identified to better understand the dynamics of chronic diseases. First, to what extent do risk factors continue to be significant in the development of chronic diseases? Second, to what extent will the modification of these risk factors impact the onset of diseases? Third, what is the role of reducing and modifying risk factors in secondary prevention and the treatment of the affected individuals? The strongest links between cardiovascular diseases or

diabetes occur between these diseases and key known risk factors in adults. These factors include tobacco use, obesity, physical inactivity, elevated cholesterol levels, high blood pressure, and alcohol use. Understanding and effectively addressing these risk factors plays a crucial role in the prevention and treatment of chronic diseases in adulthood (32).

DIETARY THERAPY

New dietary strategies for treating overweight and obesity have emerged and become popular, but they are often based on personal experiences and testimonials rather than solid scientific evidence. To develop an effective weight loss strategy, research has been conducted on animal models and clinical trials in humans to study changes in body composition and metabolic outcomes. It is important to note that successful weight loss and maintenance require lifestyle changes, including a diet that reduces energy intake, improves dietary quality, and increases physical activity (33).

The Academy of Nutrition recommends an approach that focuses on lifestyle change to achieve successful weight loss (34). This includes a diet that reduces calorie intake and improves diet quality while simultaneously increasing levels of physical activity (33). It is important to emphasize that approaches to treating overweight can vary, and some of them include cognitive-behavioral therapy, pharmacotherapy, and bariatric surgery, with each case needing analysis and customization. Regarding dietary interventions for weight loss, it is crucial to tailor the diet to the individual to achieve a negative energy balance. Diets often rely on including or excluding certain foods or food groups. There are three main categories of diets: those that manipulate the content of macronutrients (low fat, high protein, low carbohydrates), those that restrict specific foods/food groups (gluten-free, paleo diet, vegetarian/vegan, Mediterranean), and those that manipulate timing (intermittent fasting) (33).

DIETARY SUPPLEMENTS

The fundamental challenge in any discussion on the regulation of dietary supplements lies in the lack of global consensus on the definition of product categories such as dietary supplements, natural health products, complementary medicines, or nutritional supplements, which vary from country to country. Another challenge is that, although there is a general effort to protect consumers from potential harm, regulatory systems differ in each country, even in those with similar cultures, legal systems, and levels of economic development. The ultimate challenge is present in the fact that dietary supplements are often the subject of emotional and polarized debates. There is a wide range of opinions and perspectives, with some believing

that these products should be subject to the same standards as conventional drugs and food, while others believe that an adapted approach is necessary due to the often-present traditional or historical basis of evidence, as well as the higher constituent content in these products. It is important to emphasize that, despite similarities in cultures and legal systems, health products with a nutritional supplement component are subject to different rules and regulations worldwide. Without a global consensus on terminology and regulation, these issues remain challenging and require careful consideration to achieve a balance between consumer protection and support for product diversity (35).

In ideal circumstances, medical recommendations for medications or supplements should be based on rigorous studies. Most research involving dietary supplements is often not double-blind and placebo-controlled. Nevertheless, doctors should not automatically dismiss nutritional supplements solely for this reason. It is important to consider the extensive and valid clinical experience with dietary supplements, encompassing hundreds of millions of people across centuries and different cultures.

Despite the lack of ideal studies, available information on many popular dietary supplements allows for reasonable recommendations for their use. It is crucial to emphasize that the individual response to supplements varies, and before using any dietary supplement, especially for medical purposes, consultation with a specialist is advisable. Continuous monitoring of research and advancements in the field of dietary supplements contributes to a better understanding of their effects and safety (35).

PREVENTION OF DISEASES

The leading risk factor for global DALY in 2019 was childhood and maternal malnutrition, significantly affecting health in the youngest age groups, accounting for 295 million (253–350) DALY (11.6% [10.3–13.1] of all global DALY that year). The burden of risk factors varied significantly in 2019 between age groups and locations. Among children aged 0 to 9 years, the three leading risk factors for DALY were associated with malnutrition (11).

Quantitative and qualitative changes in our dietary patterns leading to dramatic shifts in life expectancy result in issues of diet-related chronic diseases. Diet-related chronic diseases typically manifest in middle and later adulthood and can increase the incidence of premature mortality, and slow the increase in life expectancy. More importantly, they lead to morbidity and resulting disability-adjusted life years (DALY) and contribute to economic losses and reduced quality of life (4).

Strategies to improve the nutritional status and growth of children must be comprehensive and include interventions that support pregnant and lactating women.

Early initiation of breastfeeding, recommended during the first six months of life, should be promoted, with continued breastfeeding along with adequate complementary feeding until the age of two. Micronutrient supplementation should be applied whenever necessary.

The World Health Organization (WHO) recommendations from 1999, in partnership with UNICEF and BASICS, contain effective, feasible, and affordable interventions (36). These interventions are most effective when combined with measures to reduce infections, further emphasizing the importance of a holistic approach.

A focus on essential nutrition measures can significantly contribute to reducing mortality among newborns and children, improving physical and mental growth and development, and enhancing overall productivity. These key actions include:

- Emphasizing the importance of exclusive breastfeeding during the first six months of life.
- Adequate complementary feeding starting at six months while continuing breastfeeding for two years.
- Proper nutrition for sick and malnourished children.
- Adequate intake of vitamin A for women and children.
- Adequate iron intake for women and children.
- Adequate iodine intake for all household members.

Improving nutrition requires collaborative efforts at the healthcare facility and within the broader community, including monitoring nutrition, identifying at-risk subpopulations, updating policies and protocols, and providing resources for implementing nutrition practices.

CONCLUSION

In this paper, we have thoroughly explored and analyzed the complex topic of nutrition, focusing on key aspects such as macro- and micronutrients, iron deficiency, anemia, childhood nutrition issues, iodine deficiency, and the role of dietary supplements. We have presented a comprehensive picture of the challenges faced by global health related to nutrition and its impact on various segments of society.

Hunger, particularly household food insecurity, is a crucial determinant of poverty in societies and a significant challenge for global health. Access to healthy, affordable food and quality nutrition should be a universal right for every individual. However, existing injustices in systems and processes structure everyday living conditions, creating profound inequalities in access to nutrition.

In 2021, between 720 and 811 million people faced hunger worldwide, emphasizing the urgency of transforming the food system to achieve food security, improved

nutrition, and accessible healthy nutrition for all. Healthy nutrition plays a crucial role not only in addressing hunger but also in enhancing the sustainability of the food system.

Malnutrition, in all its forms, is closely linked to major causes of death and disability worldwide. Nutrition is one of the key determinants of variations in disease rates, directly or indirectly impacting human health. In developing countries, we face a double burden - malnutrition coexists with the rise of nutrition-related chronic diseases.

Combating malnutrition requires a comprehensive approach that involves political commitment, cross-sectoral actions, and significant investments in data systems for monitoring and evaluation. Connecting optimal nutrition with development goes beyond traditional health interventions, paving the way to improving population health. This holistic approach is crucial for achieving global goals in the fight against malnutrition and enhancing the quality of life worldwide.

LITERATURE

1. Remington PL, Brownson RC, Wegner MV, editors. *Chronic Disease Epidemiology, Prevention, and Control*, 4th edition [Internet]. American Public Health Association; 2016 [cited 2024 Jan 19]. Available from: <http://ajph.aphapublications.org/doi/book/10.2105/9780875532783>
2. WHO. *Noncommunicable diseases: progress monitor 2020* [Internet]. 2020 [cited 2024 Jan 27]. Available from: <https://www.who.int/westernpacific/health-topics/noncommunicable-diseases>
3. *Essential nutrition actions: improving maternal, newborn, infant and young child health and nutrition* [Internet]. [cited 2024 Jan 21]. Available from: <https://www.who.int/publications-detail-redirect/9789241505550>
4. *Oxford Textbook of Global Public Health* [Internet]. Oxford Textbook of Global Public Health. Oxford University Press; [cited 2024 Jan 19]. Available from: <https://oxfordmedicine.com/view/10.1093/med/9780199661756.001.0001/med-9780199661756>
5. Shetty P. Achieving the goal of halving global hunger by 2015. *Proceedings of the Nutrition Society*. 2006; 65(1): 7–18.
6. Shetty P. Nutrition sensitive agriculture to achieve better nutritional outcomes. *Eur J Clin Nutr*. 2018; 72(9): 1296–9.
7. *Women: the key to food security* | IFPRI: International Food Policy Research Institute [Internet]. [cited 2024 Jan 21]. Available from: <https://www.ifpri.org/publication/women-key-food-security>
8. *IUFoST | Strengthening Global Food Science and Technology for Humanity* [Internet]. [cited 2024 Jan 21]. Available from: <https://www.iufost.org/>
9. Neufingerl N, Eilander A. Nutrient Intake and Status in Adults Consuming Plant-Based Diets Compared to Meat-Eaters: A Systematic Review. *Nutrients*. 2021; 14(1): 29.

10. Micha R, Mannar V, Afshin A, Allemandi L, Baker P, Battersby J, et al. 2020 Global nutrition report: action on equity to end malnutrition [Internet]. Bristol, UK: Development Initiatives; 2020 [cited 2024 Jan 21]. Available from: <https://globalnutritionreport.org/reports/2020-global-nutrition-report/>
11. GBD 2019 Risk Factors Collaborators. Global burden of 87 risk factors in 204 countries and territories, 1990-2019: a systematic analysis for the Global Burden of Disease Study 2019. *Lancet*. 2020; 396(10258): 1223–49.
12. Hall KD, Guo J. Obesity Energetics: Body Weight Regulation and the Effects of Diet Composition. *Gastroenterology*. 2017; 152(7): 1718–1727.e3.
13. Venn BJ. Macronutrients and Human Health for the 21st Century. *Nutrients*. 2020; 12(8): E2363.
14. Pajic P, Pavlidis P, Dean K, Neznanova L, Romano R-A, Garneau D, et al. Independent amylase gene copy number bursts correlate with dietary preferences in mammals. *Elife*. 2019; 8: e44628.
15. Nassar MF. The macronutrients' interplay. *Clinical Nutrition*. 2019; 38(6): 2943–4.
16. World Health Organization. Global prevalence of vitamin A deficiency in populations at risk 1995–2005: WHO global database on vitamin A deficiency [Internet]. World Health Organization; 2009 [cited 2024 Jan 20]. Available from: <https://apps.who.int/iris/handle/10665/44110>
17. Sommer A, West, Jr KP, Olson JA, Ross AC. Vitamin A Deficiency: Health, Survival and Vision. Oxford, New York: Oxford University Press; 1996. 452 p.
18. Maddock J. Public Health - Methodology, Environmental and Systems Issues [Internet]. 2012 [cited 2024 Jan 19]. Available from: <https://www.intechopen.com/books/2289>
19. Dewey KG, Brown KH. Update on technical issues concerning complementary feeding of young children in developing countries and implications for intervention programs. *Food Nutr Bull*. 2003; 24(1): 5–28.
20. Algarín C, Peirano P, Garrido M, Pizarro F, Lozoff B. Iron deficiency anemia in infancy: long-lasting effects on auditory and visual system functioning. *Pediatr Res*. 2003; 53(2): 217–23.
21. Iannotti LL, Tielsch JM, Black MM, Black RE. Iron supplementation in early childhood: health benefits and risks. *Am J Clin Nutr*. 2006; 84(6): 1261–76.
22. Bürgi H, Supersaxo Z, Selz B. Iodine deficiency diseases in Switzerland one hundred years after Theodor Kocher's survey: a historical review with some new goitre prevalence data. *Acta Endocrinol (Copenh)*. 1990; 123(6): 577–90.
23. Api O, Breyman C, Çetiner M, Demir C, Eceder T. Diagnosis and treatment of iron deficiency anemia during pregnancy and the postpartum period: Iron deficiency anemia working group consensus report. *Turk J Obstet Gynecol*. 2015; 12(3): 173–81.
24. MK, JS, MNN, GB, JM, JN, et al. Adult Dental Health Survey.: Oral Health in the United Kingdom. 2000 [cited 2024 Jan 21]; Available from: [https://kclpure.kcl.ac.uk/portal/en/publications/adult-dental-health-survey\(842e2e9d-a85b-441c-b70d-8339e4e95742\)/export.html](https://kclpure.kcl.ac.uk/portal/en/publications/adult-dental-health-survey(842e2e9d-a85b-441c-b70d-8339e4e95742)/export.html)
25. Joshipura KJ, Willett WC, Douglass CW. The impact of edentulousness on food and nutrient intake. *J Am Dent Assoc*. 1996; 127(4): 459–67.

26. Okoye L, Ekwueme O. Prevalence of Dental Caries in a Nigerian Rural Community: A Preliminary Local Survey. *Ann Med Health Sci Res.* 2011; 1(2): 187–95.
27. Mobley C, Marshall TA, Milgrom P, Coldwell SE. The Contribution of Dietary Factors to Dental Caries and Disparities in Caries. *Acad Pediatr.* 2009; 9(6): 410–4.
28. Petersen PE, Hoerup N, Poomviset N, Prommajan J, Watanapa A. Oral health status and oral health behaviour of urban and rural schoolchildren in Southern Thailand. *Int Dent J.* 2001; 51(2): 95–102.
29. Poulsen S, Malling Pedersen M. Dental caries in Danish children: 1988-2001. *Eur J Paediatr Dent.* 2002; 3(4): 195–8.
30. Kalsbeek H, Verrips GH. Consumption of sweet snacks and caries experience of primary school children. *Caries Res.* 1994; 28(6): 477–83.
31. Mikx FHM, Hoeven JS van der, Plasschaert AJM, König KG. Effect of *Actinomyces viscosus* on the Establishment and Symbiosis of *Streptococcus mutans* and *Streptococcus sanguis* in SPF Rats on Different Sucrose Diets. *CRE.* 1975; 9(1): 1–20.
32. Cole-Hamilton I, Gunner K, Leverkus C, Starr J. A study among dietitians and adult members of their households of the practicalities and implications of following proposed dietary guidelines for the UK. British Dietetic Association Community Nutrition Group Nutrition Guidelines Project. *Hum Nutr Appl Nutr.* 1986; 40(5): 365–89.
33. Freire R. Scientific evidence of diets for weight loss: Different macronutrient composition, intermittent fasting, and popular diets. *Nutrition.* 2020; 69: 110549.
34. Raynor HA, Champagne CM. Position of the Academy of Nutrition and Dietetics: Interventions for the Treatment of Overweight and Obesity in Adults. *J Acad Nutr Diet.* 2016; 116(1): 129–47.
35. Massey PB. Dietary supplements. *Medical Clinics of North America.* 2002; 86(1): 127–47.
36. Essential nutrition actions: mainstreaming nutrition through the life-course [Internet]. [cited 2024 Jan 20]. Available from: <https://www.who.int/publications-detail-redirect/9789241515856>