

STAROST I ODRŽIVA POTROŠNJA: STAVOVI I PONAŠANJE POTROŠAČA O OTPADU OD HRANE

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Rezime

Otpad od hrane predstavlja značajan izazov održivog razvoja, pri čemu domaćinstva imaju važnu ulogu u njegovom nastanku i smanjenju. Cilj ovog rada bio je da se ispituju stavovi i ponašanje potrošača u vezi sa otpadom od hrane, kao i da se utvrdi da li postoje razlike između starosnih kategorija ispitanika, u skladu sa dosadašnjim praksama u svetu. Istraživanje je sprovedeno na uzorku od 206 ispitanika sa područja Južnobačke oblasti (AP Vojvodina, R.Srbija) u periodu od septembra 2025. do februara 2026. godine. Podaci su prikupljeni primenom strukturiranog anketnog upitnika, a za ispitivanje razlika između starosnih kategorija korišćen je Hi-kvadrat test. Rezultati su pokazali da ispitanici generalno iskazuju pozitivne stavove prema smanjenju otpada od hrane, posebno kada je reč o nameri da ne bacaju hranu, pravilnom skladištenju namirnica i iskorišćavanju ostataka hrane. Dobijeni rezultati ukazuju da starost predstavlja jedan od faktora koji utiče na pojedine aspekte ponašanja potrošača u vezi sa otpadom od hrane, ali da su određene prakse odgovorne potrošnje podjednako zastupljene bez obzira na starosnu dob.

Ključne reči: otpad od hrane, održiva potrošnja, potrošači, starost, stavovi, ponašanje potrošača, Hi-kvadrat test.

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Uvod

Otpad od hrane predstavlja jedan od najizraženijih izazova savremenog sistema proizvodnje i potrošnje hrane (Stancu et al., 2016; Schanes et al., 2018; Gaiani et al., 2018; Li et al., 2023; de Oliveira Paulo et al., 2024). Pored značajnih ekonomskih gubitaka, bacanje hrane ima i ozbiljne ekološke i društvene posledice, jer podrazumeva neracionalno korišćenje prirodnih resursa, energije i ljudskog rada uložених u proizvodnju hrane (UNEP, 2024; van der Werf et al., 2019). Prema procenama Organizacije za hranu i poljoprivredu Ujedinjenih nacija (FAO), značajan deo proizvedene hrane nikada ne bude konzumiran, već završi kao otpad, što ukazuje na potrebu za efikasnijim upravljanjem hranom duž čitavog lanca snabdevanja (Schanes et al., 2018).

Iako se gubici hrane javljaju u svim fazama lanca snabdevanja, domaćinstva se sve češće prepoznaju kao jedan od najznačajnijih izvora otpada od hrane, posebno u razvijenim i zemljama u razvoju (Attiq et al., 2024; van Geffen et al., 2020). Na količinu bačene hrane utiču brojni faktori, među kojima se izdvajaju navike kupovine, planiranje obroka, način skladištenja namirnica i korišćenje ostataka hrane (Schanes et al., 2018). Zbog toga je razumevanje ponašanja potrošača od suštinskog značaja za kreiranje mera koje mogu doprineti smanjenju otpada od hrane i unapređenju održive potrošnje (Hebrok & Boks, 2017).

Poslednjih godina sve veću pažnju istraživača privlači uloga socio-demografskih karakteristika u oblikovanju stavova i ponašanja potrošača prema otpadu od hrane (Schanes et al., 2018). Među njima se starost izdvaja kao jedan od najznačajnijih faktora, jer različite generacije poseduju različita iskustva, navike i vrednosne sisteme koji mogu uticati na odnos prema kupovini, čuvanju i iskorišćavanju hrane (Schanes et al., 2018). Stariji potrošači često pokazuju veću sklonost racionalnom raspolaganju namirnicama i ponovnoj upotrebi ostataka hrane, dok mlađe generacije mogu ispoljavati drugačije potrošačke obrasce uslovljene savremenim stilom života, dinamikom rada i dostupnošću hrane (Schanes et al., 2018; Visschers et al., 2016).

Posebno značajni aspekti ponašanja potrošača u kontekstu otpada od hrane odnose se na planiranje kupovine i obroka, racionalnu nabavku namirnica, pravilno skladištenje hrane i postupanje sa ostacima nakon pripreme ili konzumacije obroka (Schanes et al., 2018). Istraživanja pokazuju da su neplanirana kupovina, kupovina većih količina namirnica od stvarnih potreba domaćinstva i kupovina pod uticajem promotivnih akcija među najčešćim faktorima koji doprinose nastanku otpada od hrane u domaćinstvima (Schanes et al., 2018; Stancu et al., 2016; van Geffen et al., 2020). Sa druge strane, planiranje kupovine, kontrola kućnih zaliha, pravilno čuvanje namirnica, ponovna upotreba ostataka hrane i deljenje viškova sa drugim članovima zajednice prepoznaju se

kao važne prakse odgovorne i održive potrošnje (Hebrok & Boks, 2017; Attiq et al., 2024). Ispitivanje ovih ponašanja omogućava bolje razumevanje načina na koji različite starosne grupe pristupaju upravljanju hranom i sprečavanju njenog bacanja (Schanes et al., 2018).

Polazeći od navedenog, predmet ovog rada jesu stavovi i ponašanje potrošača u vezi sa nastankom otpada od hrane u domaćinstvima, sa posebnim osvrtom na navike kupovine, planiranja obroka, skladištenja i ponovne upotrebe ostataka hrane. Istraživanje je usmereno na analizu načina na koji potrošači percipiraju problem bacanja hrane, kao i na identifikaciju razlika u stavovima i ponašanju u odnosu na starosnu dob ispitanika.

Zadatak rada je da se ispituju stavovi i ponašanje potrošača u vezi sa otpadom od hrane u domaćinstvima, sa posebnim osvrtom na navike kupovine, planiranja obroka, skladištenja i iskorišćavanja ostataka hrane. Takođe, zadatak rada je da se utvrdi u kojoj meri starosna dob utiče na razlike u stavovima i ponašanju potrošača prema problemu otpada od hrane.

Cilj rada je da se analiziraju stavovi i ponašanje potrošača u vezi sa nastankom otpada od hrane u domaćinstvima, kao i da se identifikuju razlike između starosnih grupa u pogledu odgovorne potrošnje, upravljanja hranom i sprečavanja bacanja hrane. Dobijeni rezultati treba da doprinesu boljem razumevanju faktora koji utiču na nastanak otpada od hrane i pruže osnovu za kreiranje mera usmerenih ka podsticanju održivijih potrošačkih praksi.

2 Metodologija istraživanja

2.1. Instrument istraživanja

Za potrebe istraživanja kreiran je anketni upitnik na osnovu pregleda relevantne domaće i međunarodne naučne literature koja se bavi problematikom otpada od hrane u domaćinstvima, održivom potrošnjom i ponašanjem potrošača, među kojima su istraživanja koja su sprovedi (Stancu et al., 2016; Li et al., 2023; Gaiani et al., 2018; Campbell et al., 2025; de Oliveira Paulo et al., 2024; Pitoska & Damianos, 2023). Prilikom konstruisanja upitnika korišćeni su pristupi i rešenja primenjivani u prethodnim istraživanjima, uz njihovo prilagođavanje predmetu, cilju i istraživačkim pitanjima ovog rada.

Pre sprovođenja glavnog istraživanja realizovano je pilot istraživanje na manjem broju ispitanika radi provere razumljivosti pitanja, jasnoće formulacija i funkcionalnosti upitnika. Na osnovu dobijenih sugestija izvršene su manje korekcije pojedinih pitanja, nakon čega je formirana konačna verzija instrumenta za prikupljanje podataka.

Anketni upitnik sastojao se iz više celina, od kojih su dve prekazane u ovom radu:

Prvi deo obuhvatao je pitanja koja se odnose na socio-demografske karakteristike ispitanika, uključujući pol, starost, nivo obrazovanja, radni status, visinu mesečnih primanja i tip naselja u kome ispitanik živi.

Drugi deo upitnika bio je usmeren na ispitivanje stavova i ponašanja potrošača u vezi sa otpadom od hrane u domaćinstvu. Obuhvatao je tvrdnje koja se odnose na navike kupovine i planiranja obroka, skladištenje namirnica, učestalost bacanja hrane, najčešće razloge nastanka otpada od hrane, kao i stavove o značaju smanjenja otpada od hrane i primeni principa održive potrošnje. Za merenje stavova ispitanika korišćena je Likertova skala od pet stepeni slaganja, pri čemu su ispitanici iskazivali stepen slaganja sa ponuđenim tvrdnjama od 1 – „uopšte se ne slažem“ do 5 – „u potpunosti se slažem“.

2.2. Sprovođenje istraživanja

Istraživanje je sprovedeno u periodu od marta do juna 2026. godine. Uzorak su činili punoletni stanovnici Južnobačke oblasti (AP Vojvodina, R.Srbija), a učešće u istraživanju bilo je dobrovoljno i anonimno. Prikupljanje podataka realizovano je elektronskim putem, što je omogućilo obuhvatanje ispitanika različitih starosnih kategorija i socio-demografskih obeležja. Nakon provere ispravnosti i kompletnosti odgovora, u dalju analizu uključeno je ukupno 206 valjano popunjenih upitnika.

2.2.1. Statistička obrada podataka

Za obradu prikupljenih podataka korišćene su metode deskriptivne i inferencijalne statistike. Rezultati su prikazani primenom apsolutnih i relativnih frekvencija, kao i vrednosti aritmetičke sredine i standardne devijacije. Za utvrđivanje postojanja statistički značajnih razlika u stavovima i ponašanju potrošača prema otpadu od hrane u odnosu na starosnu dob ispitanika primenjen je Hi-kvadrat test nezavisnosti (χ^2). Ovaj test omogućio je ispitivanje povezanosti između starosnih kategorija i pojedinih oblika ponašanja i stavova povezanih sa otpadom od hrane. Statistička značajnost procenijavana je na nivou $p < 0,05$ (Mutavdžić i sar., 2023).

2.2.2. Opis uzoraka

U istraživanju su većinu ispitanika činile žene (71,4%), dok su muškarci bili zastupljeni sa 28,6%. Najveći udeo ispitanika pripadao je starosnoj grupi od 31 do 45 godina (45,1%), a zatim grupi do 30 godina starosti (39,3%). Prema obrazovnoj strukturi, najzastupljeniji su bili ispitanici sa završenim fakultetom (45,6%) i srednjom školom (44,7%). Većina ispitanika bila je zaposlena sa punim radnim vremenom (66,5%), dok je 43% navelo da ostvaruje mesečna primanja približna republičkom proseku. Posmatrano prema mestu stanovanja, skoro polovina ispitanika (49%) živi u gradskim sredinama, što ukazuje da uzorak prevashodno čine radno aktivni ispitanici srednje životne dobi iz urbanih i prigradskih područja (tabela 1).

Tabela 1. Socio-demografske karakteristike ispitanika (n=206)

Karakteristika	Kategorija	n	%
Pol	Muški	59	28,6
	Ženski	147	71,4
Starost	Do 30 godina	81	39,3
	31–45 godina	93	45,1
	46–60 godina	27	13,1
	Preko 60 godina	5	2,4
Obrazovanje	Srednja škola	92	44,7
	Visa škola	20	9,7
	Fakultet	94	45,6
Radni status	Zaposlen/a sa punim radnim vremenom	137	66,5
	Zaposlen/a sa nepunim radnim vremenom	16	7,8
	Nezaposlen/a	15	7,3
	Učenik/student	35	17,0
	Penzioner	3	1,5
Visina mesečnih primanja	Ispod proseka	68	33,0
	Oko proseka	89	43,0
	Iznad proseka	49	24,0
Tip naselja	Gradsko	101	49,0
	Prigradsko	80	39,0
	Ruralno	25	12,0

Izvor: obrada autora

3 Rezultati istraživanja sa diskusijom

3.1. Analiza stavova i ponašanja ispitanika u vezi sa bacanjem hrane

U cilju sagledavanja stavova i ponašanja potrošača u vezi sa otpadom od hrane u domaćinstvima, ispitanici su ocenjivali niz tvrdnji koje se odnose na kupovinu, planiranje obroka, skladištenje namirnica i postupanje sa ostacima hrane. Rezultati su prikazani kroz vrednosti aritmetičke sredine i standardne devijacije, što omogućava uvid u stepen slaganja ispitanika sa ponuđenim tvrdnjama i varijabilnost njihovih odgovora.

Na osnovu rezultata iz Tabele 2 može se uočiti da su ispitanici najveći stepen slaganja iskazali sa tvrdnjama da imaju nameru da ne bacaju hranu (AS=5,66) i da ostatke hrane pravilno skladište kako bi duže trajali (AS=5,26). Visoke vrednosti aritmetičkih sredina zabeležene su i kod tvrdnji koje se odnose na iskorišćavanje preostale hrane (AS=5,02) i kupovinu samo potrebnih količina namirnica (AS=4,92), što ukazuje na razvijenu svest o značaju odgovornog upravljanja hranom. Sa druge strane, najniži stepen slaganja zabeležen je kod tvrdnje da često kupuju količine hrane veće od potreba domaćinstva (AS=3,30). Ipak, umerene vrednosti kod neplanirane kupovine (AS=4,21) i kupovine većih

količina hrane na popustu ($AS=3,80$) ukazuju na ponašanja koja mogu doprineti nastanku otpada od hrane, što potvrđuju i Stancu i sar. (2016).

Tabela 2. Generalni stavovi ispitanika vezano za bacanje hrane iz domaćinstva ($n=206$)

Redni broj	Tvrdnja	Aritmetička sredina	Standardna devijacija
1.	Namera mi je da ne bacam hranu.	5,66	2,128
2.	Često kupujemo hranu koju nismo planirali.	4,21	1,998
3.	Često kupujemo količine hrane koje su prevelike za potrebe našeg domaćinstva.	3,30	1,919
4.	Obično kupujemo veće količine hrane kada je ona na popustu.	3,80	2,133
5.	Hranu koja ostane obično pojedem u izvornom obliku ili doradim pa pojedem.	5,02	1,809
6.	Pazim da ostatke hrane pravilno skladištim kako bi trajali duže.	5,26	1,900
7.	Hranu koja ostane u velikim količinama podelim porodici, prijateljima, doniram...	4,79	2,098
8.	Kupovine najčešće planiram unapred - pravim spisak i proveravam zalihe kod kuće.	4,74	2,043
9.	Obroke obično planiram unapred za nekoliko dana.	3,97	1,931
10.	Trudim se da kupujem samo ono što mi je potrebno za planirane obroke, kako bi izbegao/la bacanje hrane.	4,92	1,911

Izvor: obrada autora

Visoke ocene za pravljenje spiska za kupovinu ($AS=4,74$) i planiranje obroka ($AS=3,97$) ukazuju na prisutnost praksi koje doprinose racionalnijoj potrošnji hrane, što je u skladu sa nalazima Principato i sar. (2015). Ipak, kao što ističu Schanes i sar. (2018), između pozitivnih stavova i stvarnog ponašanja potrošača često postoji određen jaz, što se može uočiti i u rezultatima ovog istraživanja.

3.2. Analiza razlika u godinama starosti i stavovima u vezi sa bacanjem hrane

U nastavku su prikazani rezultati analize razlika u stavovima ispitanika prema otpadu od hrane u zavisnosti od starosne kategorije. Najpre je analizirano da li postoje razlike u starosti ispitanika i njihovim stavovima o tvrdnji da im je namera da ne bacaju hranu (Tabela 3).

Na osnovu rezultata prikazanih u Tabeli 3 može se uočiti da postoji statistički značajna razlika između starosnih kategorija ($p<0,05$). Kao što se može primetiti, mlađi ispitanici su u većoj meri imali pozitivan stav u odnosu na starije grupe ispitanika. Slične rezultate navode Secondi et al. (2015), koji su utvrdili da su mlađe generacije svesnije problema otpada od hrane i češće iskazuju pozitivne

stavove prema njegovom smanjenju. Međutim, pojedina istraživanja ukazuju da pozitivni stavovi ne moraju uvek biti praćeni odgovarajućim ponašanjem, odnosno da postoji jaz između namere i stvarne prakse u domaćinstvima (Schanes et al., 2018).

Tabela 3. Rezultati Hi-kvadrat testa razlika u starosnim kategorijama ispitanika i njihovim stavovima o tvrdnji da im je namera da ne bacaju hranu

		Namera mi je da ne bacam hranu.			Ukupno
		Negativan stav	Neutralan stav	Pozitivan stav	
Godine	Do 30 godina	6	2	73	81
	Od 31 do 45 godina	19	4	70	93
	Od 46 do 60 godina	8	0	19	27
	Preko 60 godina	4	0	1	5
Ukupno		37	6	163	206
		$\chi^2=23,568$; $p=0,001$			

Izvor: obrada autora

Rezultati Hi-kvadrat testa pokazali su da ne postoji statistički značajna razlika između starosnih kategorija ispitanika i njihovih stavova o tvrdnji da često kupuju hranu koju nisu planirali ($p>0,05$). Ovakav nalaz ukazuje da je sklonost neplaniranoj kupovini prisutna u svim starosnim grupama u sličnoj meri. Prema navodima Stancu i sar. (2016), neplanirana kupovina predstavlja jedan od čestih obrazaca potrošačkog ponašanja koji može doprineti nastanku otpada od hrane, ali nije nužno uslovljen starošću potrošača.

Istraživanje je takođe pokazalo da ne postoji statistički značajna razlika između starosnih kategorija ispitanika i njihovih stavova o tvrdnji da često kupuju količine hrane koje su prevelike za potrebe njihovog domaćinstva ($p>0,05$). Ovo ukazuje da je percepcija prekomerne kupovine relativno ujednačena među ispitanicima različite starosti. Slično tome, Aschemann-Witzel i sar. (2015) ističu da su prekomerna kupovina i stvaranje viškova hrane povezani sa potrošačkim navikama i organizacijom domaćinstva, a ne isključivo sa starošću potrošača.

Dalje izveden Hi-kvadrat test utvrdio je postojanje razlika u starosti ispitanika njihovim stavovima o tvrdnji da obično kupuju veće količine hrane kada je ona na popustu ($p<0,05$) (Tabela 4).

Dobijeni rezultati (Tabela 4) ukazuju da su razlike u stavovima izraženije kod mlađih i sredovečnih ispitanika, dok su ispitanici starijih starosnih kategorija skloniji pozitivnom stavu ili su ređe zastupljeni u negativnoj kategoriji. Ovakav nalaz može se objasniti činjenicom da stariji potrošači češće posmatraju kupovinu

na akcijama kao način racionalnijeg upravljanja kućnim budžetom. Slične rezultate navode Aschemann-Witzel i sar. (2015), ističući da promotivne akcije i sniženja predstavljaju jedan od najvažnijih faktora koji utiču na kupovinu većih količina hrane od stvarno potrebnih. Takođe, Stancu i sar. (2016) ukazuju da kupovina namirnica na popustu može dovesti do stvaranja viškova hrane u domaćinstvu i povećati rizik od njenog kasnijeg bacanja, posebno ukoliko kupovina nije praćena adekvatnim planiranjem potrošnje.

Tabela 4. Rezultati Hi-kvadrat testa razlika u starosti ispitanika i njihovim stavovima o tvrdnji da obično kupuju veće količine hrane kada je ona na popustu

		Obično kupujemo veće količine hrane kada je ona na popustu.			Ukupno
		Negativan stav	Neutralan stav	Pozitivan stav	
Godine	Do 30 godina	37	6	38	81
	Od 31 do 45 godina	57	8	29	93
	Od 46 do 60 godina	9	0	18	27
	Preko 60 godina	3	2	0	5
Ukupno		106	15	85	206
		$\chi^2=22,579$; $p=0,001$			

Izvor: obrada autora

Dalje istraživanje utvrdilo je postojanje razlike u starosti ispitanika i njihovim stavovima o tvrdnji da hranu koja ostane obično pojedu u izvornom obliku ili dorade pa pojedu ($p<0,05$) (Tabela 5).

Tabela 5. Rezultati Hi-kvadrat testa razlika u starosti ispitanika i njihovim stavovima o tvrdnji da hranu koja ostane obično pojedu u izvornom obliku ili dorade pa pojedu

		Hranu koja ostane obično pojedem u izvornom obliku ili doradim pa pojedem.			Ukupno
		Negativan stav	Neutralan stav	Pozitivan stav	
Godine	Do 30 godina	5	8	68	81
	Od 31 do 45 godina	32	7	54	93
	Od 46 do 60 godina	7	2	18	27
	Preko 60 godina	2	0	3	5
Ukupno		46	17	143	206
		$\chi^2=21,440$; $p=0,002$			

Izvor: obrada autora

Dobijeni rezultati ukazuju da pozitivan stav prema ponovnoj upotrebi ostataka hrane dominira u svim starosnim kategorijama, pri čemu je ovaj stav najizraženiji kod ispitanika mlađih od 30 godina i ispitanika starosti od 31 do 45 godina (Tabela 5). Ovakav nalaz je u skladu sa istraživanjima koja pokazuju da je iskorišćavanje preostale hrane jedna od najčešće primenjivanih praksi za smanjenje otpada od hrane u domaćinstvima (Principato et al., 2015). Pored toga, Schanes i sar. (2018) ističu da ponovna upotreba ostataka hrane predstavlja važan element odgovornog upravljanja hranom, jer direktno doprinosi smanjenju količine otpada i racionalnijem korišćenju raspoloživih resursa.

Takođe Hi-kvadrat test je utvrdio postojanje razlika u starosti ispitanika njihovim stavovima o tvrdnji da paze da ostatke hrane pravilno skladište kako bi trajali duže ($p < 0,05$) (Tabela 6).

Tabela 6. Rezultati Hi-kvadrat testa razlika u starosti ispitanika i njihovim stavovima o tvrdnji da paze da ostatke hrane pravilno skladište kako bi trajali duže

		Pazim da ostatke hrane pravilno skladištim kako bi trajali duže.			Ukupno
		Negativan stav	Neutralan stav	Pozitivan stav	
Godine	Do 30 godina	7	3	71	81
	Od 31 do 45 godina	28	12	53	93
	Od 46 do 60 godina	7	2	18	27
	Preko 60 godina	0	0	5	5
Ukupno		42	17	147	206
		$\chi^2=24,961$; $p=0,000$			

Izvor: obrada autora

Iako pozitivan stav dominira u svim starosnim grupama, ispitanici starosti od 31 do 45 godina nešto češće su iskazivali negativan stav u odnosu na ostale kategorije ispitanika (Tabela 6). Dobijeni rezultati su u skladu sa nalazima Stancu i sar. (2016), koji ističu da su pravilno skladištenje namirnica i praćenje rokova upotrebe među najvažnijim faktorima za smanjenje otpada od hrane u domaćinstvima. Takođe, Aschemann-Witzel i sar. (2015) naglašavaju da nedovoljno poznavanje načina čuvanja hrane često dovodi do njenog prevremenog kvarenja i bacanja.

U narednom koraku analizirano je da li postoje razlike između starosnih kategorija ispitanika i njihovim stavovima o tvrdnji da hranu koja ostane u velikim količinama podele porodici, prijateljima ili doniraju (Tabela 7).

Tabela 7. Rezultati Hi-kvadrat testa razlika u starosti ispitanika i njihovim stavovima o tvrdnji da hranu koja ostane u velikim količinama podele porodici, prijateljima, doniraju

		Hranu koja ostane u velikim količinama podelim porodici, prijateljima, doniram...			Ukupno
		Negativan stav	Neutralan stav	Pozitivan stav	
Godine	Do 30 godina	14	6	61	81
	Od 31 do 45 godina	41	6	46	93
	Od 46 do 60 godina	8	2	17	27
	Preko 60 godina	0	2	3	5
Ukupno		63	16	127	206
		$\chi^2=21,777$; $p=0,001$			

Izvor: obrada autora

Na osnovu rezultata prikazanih u Tabeli 7 može se uočiti da postoji statistički značajna razlika između starosnih kategorija ispitanika i njihovih stavova o tvrdnji da hranu koja ostane u većim količinama podele porodici, prijateljima ili doniraju ($p<0,05$). Ispitanici starosti od 31 do 60 godina bili su skloniji da imaju negativan stav prema ovoj tvrdnji u odnosu na najmlađe i najstarije ispitanike. Dobijeni rezultati su u skladu sa nalazima Schanes i sar. (2018), koji ističu da deljenje viškova hrane predstavlja jednu od efikasnih strategija za smanjenje otpada od hrane u domaćinstvima. Takođe, Aschemann-Witzel i sar. (2015) navode da su socijalne norme, porodične navike i razvijenost lokalnih mehanizama donacije značajni faktori koji utiču na spremnost potrošača da viškove hrane ustupe drugima umesto da ih bace.

Rezultati Hi-kvadrat testa pokazali su da ne postoji statistički značajna razlika između starosnih kategorija ispitanika i njihovih stavova o tvrdnji da kupovine najčešće planiraju unapred, prave spisak i proveravaju zalihe namirnica kod kuće ($p>0,05$). Ovakav nalaz ukazuje da je planiranje kupovine podjednako zastupljeno među ispitanicima različite starosti. Prema navodima Principato i sar. (2015), pravljenje spiska za kupovinu i provera postojećih zaliha predstavljaju jedne od najefikasnijih praksi za sprečavanje prekomerne kupovine i smanjenje otpada od hrane u domaćinstvima.

Takođe, rezultati Hi-kvadrat testa pokazali su da ne postoji statistički značajna razlika između starosnih kategorija ispitanika i njihovih stavova o tvrdnji da obroke obično planiraju unapred za nekoliko dana ($p>0,05$). Dobijeni rezultati ukazuju da je ova praksa prisutna u svim starosnim grupama u sličnoj meri. Slično tome, Stancu i sar. (2016) navode da planiranje obroka predstavlja važan mehanizam

za racionalniju potrošnju namirnica i smanjenje količine otpada od hrane, nezavisno od starosti potrošača.

I na kraju, slično predhodnom, rezultati istraživanja i testiranja su pokazali da ne postoji statistički značajna razlika između starosnih kategorija ispitanika i njihovih stavova o tvrdnji da se trude da kupuju samo ono što im je potrebno za planirane obroke kako bi izbegli bacanje hrane ($p>0,05$). Ovakav nalaz ukazuje da je svest o značaju racionalne kupovine prisutna bez obzira na starosnu dob ispitanika. Aschemann-Witzel i sar. (2015) ističu da kupovina količina hrane u skladu sa stvarnim potrebama domaćinstva predstavlja jedan od ključnih preduslova za smanjenje otpada od hrane i unapređenje održive potrošnje.

4 Zaključak

Analizom stavova i ponašanja potrošača sa prostora Južnobačke oblasti (AP Vojvodina, R.Srbija) u vezi sa otpadom od hrane dolazi se do zaključaka koji ukazuju na postojanje određenih obrazaca ponašanja zajedničkih većini ispitanika, ali i na razlike koje se mogu povezati sa njihovom starosnom dobi. Posebno su izdvojeni aspekti koji se odnose na nameru smanjenja otpada od hrane, iskorišćavanje ostataka hrane, skladištenje namirnica i postupanje sa viškovima hrane.

Rezultati istraživanja pokazali su da ispitanici generalno iskazuju pozitivne stavove prema sprečavanju otpada od hrane i primeni odgovornih potrošačkih praksi. Većina ispitanika ima nameru da smanji bacanje hrane, pravilno skladišti namirnice i iskoristi ostatke hrane, što ukazuje na razvijenu svest o značaju racionalnog upravljanja hranom u domaćinstvima. Istovremeno, rezultati su pokazali da su neplanirana kupovina i kupovina većih količina hrane na popustu i dalje prisutni oblici ponašanja koji mogu doprineti nastanku otpada od hrane.

Primenom Hi-kvadrat testa utvrđeno je da starost predstavlja značajan faktor kod pojedinih stavova i ponašanja povezanih sa otpadom od hrane. Statistički značajne razlike zabeležene su kod stavova koji se odnose na nameru da se hrana ne baca, kupovinu većih količina hrane na popustu, iskorišćavanje preostale hrane, pravilno skladištenje namirnica i deljenje viškova hrane sa porodicom, prijateljima ili putem donacija. Sa druge strane, kod stavova koji se odnose na neplaniranu kupovinu, kupovinu prekomernih količina hrane, pravljenje spiska za kupovinu, planiranje obroka i kupovinu namirnica u skladu sa planiranim potrebama nisu utvrđene statistički značajne razlike između starosnih grupa.

Dobijeni rezultati ukazuju da su određeni aspekti odgovornog upravljanja hranom uslovljeni starosnom dobi potrošača, dok su drugi podjednako zastupljeni bez obzira na godine starosti. Na osnovu toga može se zaključiti da starost predstavlja jedan od faktora koji oblikuje stavove prema otpadu od hrane, ali ne i jedini faktor

koji određuje potrošačko ponašanje. Rezultati istraživanja mogu poslužiti kao osnova za kreiranje edukativnih aktivnosti i mera usmerenih ka podsticanju održivije potrošnje i smanjenju otpada od hrane u domaćinstvima različitih starosnih grupa.

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Sukob interesa

Autori izjavljuju da ne postoji sukob interesa

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AGE AND SUSTAINABLE CONSUMPTION: CONSUMERS' ATTITUDES AND BEHAVIOUR TOWARDS FOOD WASTE

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Abstract

Food waste represents a major challenge to sustainable development, with households playing a critical role in both its generation and prevention. The aim of this study was to examine consumers' attitudes and behaviours regarding household food waste and to determine whether differences exist among age groups, in line with previous international research. The study was conducted on a sample of 206 respondents from the South Bačka District (Autonomous Province of Vojvodina, Republic of Serbia) between September 2025 and February 2026. Data were collected using a structured questionnaire, while differences among age groups were assessed using the chi-square test of independence. The findings indicate that respondents generally expressed positive attitudes towards reducing food waste, particularly regarding their intention to avoid wasting food, proper food storage practices, and the utilization of leftover food. The results further suggest that age is one of the factors influencing certain aspects of consumer behaviour related to food waste; however, several responsible consumption practices were found to be consistently adopted regardless of respondents' age.

Keywords: food waste; sustainable consumption; consumers; age; attitudes; consumer behaviour; chi-square test

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1 Introduction

Food waste has emerged as one of the most pressing challenges facing contemporary food production and consumption systems (Stancu et al., 2016; Schanes et al., 2018; Gaiani et al., 2018; Li et al., 2023; de Oliveira Paulo et al., 2024). Beyond the substantial economic losses it generates, food waste also has profound environmental and social consequences, as it represents an inefficient use of the natural resources, energy, and human labour invested throughout the food production process (UNEP, 2024; van der Werf et al., 2019).

According to estimates published by the Food and Agriculture Organization of the United Nations (FAO), a considerable proportion of food produced for human consumption is never actually consumed but instead becomes waste, highlighting the urgent need for more effective food management practices across the entire food supply chain (Schanes et al., 2018).

Although food losses occur at every stage of the supply chain, households have increasingly been recognized as one of the largest contributors to food waste, particularly in both developed and developing countries (Attiq et al., 2024; van Geffen et al., 2020). Household food waste is influenced by numerous factors, including shopping habits, meal planning, food storage practices, and the management of leftovers (Schanes et al., 2018). Consequently, gaining a better understanding of consumer behaviour is essential for designing effective interventions aimed at reducing food waste and promoting more sustainable patterns of consumption (Hebrok & Boks, 2017).

In recent years, increasing research attention has been directed towards the role of socio-demographic characteristics in shaping consumers' attitudes and behaviours related to food waste (Schanes et al., 2018). Among these characteristics, age has consistently emerged as one of the most influential factors, as different generations possess distinct life experiences, consumption habits, and value systems that may affect how they purchase, store, and utilize food (Schanes et al., 2018). Older consumers are generally more inclined to manage food resources rationally and to reuse leftovers, whereas younger generations often display different consumption patterns shaped by contemporary lifestyles, demanding work schedules, and greater food availability (Schanes et al., 2018; Visschers et al., 2016).

Particularly important aspects of consumer behaviour related to food waste include shopping and meal planning, rational food purchasing, proper food storage, and the management of leftovers following meal preparation or consumption (Schanes et al., 2018). Previous studies have demonstrated that unplanned shopping, purchasing quantities that exceed household needs, and buying food primarily because it is discounted are among the most common

drivers of household food waste (Schanes et al., 2018; Stancu et al., 2016; van Geffen et al., 2020). Conversely, shopping planning, monitoring household food stocks, proper food storage, reusing leftovers, and sharing surplus food with others are widely recognized as key practices supporting responsible and sustainable consumption (Hebrok & Boks, 2017; Attiq et al., 2024). Examining these behaviours provides valuable insights into how different age groups manage food resources and contribute to food waste prevention (Schanes et al., 2018).

Against this background, the present study investigates consumers' attitudes and behaviours related to household food waste, with particular emphasis on shopping habits, meal planning, food storage, and the utilization of leftovers. Specifically, the study seeks to explore how consumers perceive the problem of food waste and whether their attitudes and behaviours differ across age groups.

The objectives of this study are twofold. First, it aims to examine consumers' attitudes and behaviours regarding household food waste, focusing on shopping habits, meal planning, food storage practices, and the utilization of leftover food. Second, it seeks to determine the extent to which age influences differences in consumers' attitudes and behaviours towards food waste.

The aim of this research is to analyse consumers' attitudes and behaviours associated with household food waste and to identify age-related differences in responsible consumption, household food management, and food waste prevention. The findings are expected to contribute to a better understanding of the factors influencing household food waste and to provide an evidence-based foundation for developing measures and educational initiatives that encourage more sustainable consumer practices.

2 Methodology

2.1. Research Instrument

The research instrument employed in this study was a structured questionnaire developed following an extensive review of relevant national and international scientific literature addressing household food waste, sustainable consumption, and consumer behaviour. In particular, the questionnaire was informed by previous studies conducted by Stancu et al. (2016), Li et al. (2023), Gaiani et al. (2018), Campbell et al. (2025), de Oliveira Paulo et al. (2024), and Pitoska and Damianos (2023). The questionnaire was designed by adapting validated approaches and measurement items reported in previous research to reflect the objectives, research questions, and context of the present study.

Prior to the main survey, a pilot study was conducted on a smaller sample of respondents to evaluate the clarity, comprehensibility, and overall functionality of

the questionnaire. Based on participants' feedback, minor revisions were made to improve the wording and clarity of several questions, resulting in the final version of the survey instrument.

The questionnaire consisted of several sections, two of which are presented in this paper:

- The first section collected respondents' socio-demographic information, including gender, age, educational attainment, employment status, monthly household income, and type of residential area.
- The second section examined consumers' attitudes and behaviours related to household food waste. It included statements addressing shopping habits, meal planning, food storage practices, the frequency of food disposal, the most common reasons for food waste generation, as well as respondents' attitudes towards food waste reduction and sustainable consumption practices. Attitudinal variables were measured using a five-point Likert scale ranging from 1 ("strongly disagree") to 5 ("strongly agree").

2.2. Data Collection

The study was conducted from March to June 2026. The sample consisted of adult residents of the South Bačka District (Autonomous Province of Vojvodina, Republic of Serbia). Participation was voluntary, anonymous, and based on informed consent. Data were collected electronically, enabling participation from respondents representing different age groups and socio-demographic backgrounds. Following data screening and quality assessment, 206 valid questionnaires were retained for statistical analysis.

2.3. Statistical Analysis

The collected data were analysed using both descriptive and inferential statistical methods. Descriptive statistics included absolute and relative frequencies, arithmetic means, and standard deviations to summarize respondents' characteristics and questionnaire responses. To examine whether consumers' attitudes and behaviours regarding household food waste differed across age groups, the Chi-square test of independence (χ^2) was employed. This statistical procedure enabled the assessment of associations between respondents' age categories and various food waste-related attitudes and behavioural practices. Statistical significance was determined at the $p < 0.05$ level (Mutavdžić et al., 2023).

2.4. Sample Characteristics

The study sample consisted predominantly of women, who represented 71.4% of all respondents, while men accounted for 28.6%. The largest proportion of

respondents belonged to the 31–45 years age group (45.1%), followed by respondents younger than 30 years (39.3%). Regarding educational attainment, the majority had either completed higher education (45.6%) or secondary education (44.7%). Most respondents were employed full-time (66.5%), whereas 43.0% reported monthly incomes approximately equal to the national average. With respect to place of residence, nearly half of the respondents (49.0%) lived in urban areas, followed by suburban (39.0%) and rural (12.0%) settlements. Overall, the sample primarily comprised economically active, middle-aged individuals residing in urban and suburban environments (Table 1).

Table 1. Socio-demographic characteristics of respondents (n=206)

	Category	n	%
Gender	Male	59	28.6
	Female	147	71.4
Age	Up to 30 years	81	39.3
	31–45 years	93	45.1
	46–60 years	27	13.1
	Over 60 years	5	2.4
Education	Secondary school	92	44.7
	College	20	9.7
	University degree	94	45.6
Employment status	Full-time employed	137	66.5
	Part-time employed	16	7.8
	Unemployed	15	7.3
	Student	35	17.0
	Retired	3	1.5
Monthly income	Below average	68	33.0
	Around average	89	43.0
	Above average	49	24.0
Type of settlement	Urban	101	49.0
	Suburban	80	39.0
	Rural	25	12.0

Source: Authors' calculations

3 Results and Discussion

3.1 Analysis of Respondents' Attitudes and Behaviors Regarding Food Waste

To obtain a comprehensive understanding of consumers' attitudes and behaviours related to household food waste, respondents were asked to evaluate a series of statements concerning food purchasing, meal planning, food storage practices, and the management of leftover food. The results are presented using arithmetic means and standard deviations, providing an overview of respondents' levels of agreement with each statement as well as the variability of their responses.

Table 2. General attitudes and behaviours regarding household food waste

No.	Statement	Arithmetic Mean	Standard Deviation
1.	I intend not to waste food.	5,66	2,128
2.	We often buy food that we did not plan to purchase.	4,21	1,998
3.	We often buy more food than our household needs.	3,30	1,919
4.	We usually buy larger quantities when food is on sale.	3,80	2,133
5.	I usually consume leftover food as it is or after repurposing it.	5,02	1,809
6.	I store leftover food properly to prolong its shelf life.	5,26	1,900
7.	I share surplus food with family, friends or donate it.	4,79	2,098
8.	I usually plan shopping by making a list and checking food stocks.	4,74	2,043
9.	I usually plan meals several days in advance.	3,97	1,931
10.	I buy only the food needed for planned meals to avoid waste.	4,92	1,911

Source: Authors' calculations

The findings presented in Table 2 indicate that respondents expressed the strongest agreement with the statement that they intend to avoid wasting food ($M = 5.66$), followed by the statement that they properly store leftover food to extend its shelf life ($M = 5.26$). Similarly high mean scores were observed for statements referring to the consumption or reuse of leftover food ($M = 5.02$) and purchasing only the quantities of food required for planned meals ($M = 4.92$). These findings suggest a relatively high level of awareness regarding responsible household

food management. Conversely, the lowest level of agreement was recorded for the statement indicating that respondents frequently purchase quantities of food exceeding their household's actual needs ($M = 3.30$). Nevertheless, moderate agreement with statements concerning unplanned food purchases ($M = 4.21$) and purchasing larger quantities of discounted food products ($M = 3.80$) indicates that these behaviours remain relatively common and may contribute to the generation of household food waste, supporting the findings reported by Stancu et al. (2016).

Furthermore, relatively high agreement with statements related to preparing shopping lists ($M = 4.74$) and planning meals in advance ($M = 3.97$) suggests that respondents generally adopt practices associated with more rational food consumption, consistent with the findings of Principato et al. (2015). However, as emphasized by Schanes et al. (2018), a discrepancy frequently exists between consumers' positive attitudes towards food waste prevention and their actual behaviour, a phenomenon that is also evident in the present study.

3.2. Analysis of Differences in Age and Attitudes Towards Food Waste

The following section presents the results of the analysis examining differences in respondents' attitudes towards household food waste according to age group. Initially, the association between respondents' age and their intention to avoid wasting food was examined (Table 3).

Table 3. Chi-square analysis of respondents' age and their intention to avoid wasting food

		I intend not to waste food.			Total
		Negative attitude	Neutral attitude	Positive attitude	
Age	Up to 30 years	6	2	73	81
	31–45 years	19	4	70	93
	46–60 years	8	0	19	27
	Over 60 years	4	0	1	5
Total		37	6	163	206
$\chi^2=23,568$; $p=0,001$					

Source: Authors' calculations

The results presented in Table 3 reveal a statistically significant association between respondents' age and their intention to avoid wasting food ($\chi^2 = 23.568$, $p = 0.001$). Younger respondents demonstrated a stronger positive attitude towards avoiding food waste compared with older age groups. This finding is consistent with the study by Secondi et al. (2015), who reported that younger generations tend to exhibit greater awareness of food waste issues and express stronger support for food waste reduction initiatives. Nevertheless, previous

research has also shown that positive attitudes do not necessarily translate into responsible behaviour, highlighting the well-documented intention–behaviour gap in household food waste management (Schanes et al., 2018).

Subsequent analyses showed no statistically significant association between respondents' age and their agreement with the statement that they frequently purchase food that had not been planned ($p > 0.05$). This finding suggests that impulsive food purchasing is similarly prevalent across all age categories. According to Stancu et al. (2016), unplanned purchasing represents one of the most common consumer behaviours contributing to household food waste; however, it is not necessarily determined by consumers' age.

Similarly, no statistically significant relationship was identified between age and respondents' perceptions that they often purchase quantities of food exceeding household needs ($p > 0.05$). This indicates that excessive purchasing is perceived relatively consistently across different age groups. Comparable conclusions were reported by Aschemann-Witzel et al. (2015), who suggested that excessive food purchasing is more closely associated with shopping habits, household organization, and purchasing routines than with consumers' age.

The Chi-square analysis identified a statistically significant relationship between respondents' age and their attitudes towards purchasing larger quantities of food when products are offered at discounted prices ($p < 0.05$) (Table 4).

Table 4. Chi-square analysis of respondents' age and attitudes towards purchasing discounted food in larger quantities

		We usually buy larger quantities of food when it is on sale.			Total
		Negative attitude	Neutral attitude	Positive attitude	
Age	Up to 30 years	37	6	38	81
	31–45 years	57	8	29	93
	46–60 years	9	0	18	27
	Over 60 years	3	2	0	5
Total		106	15	85	206
		$\chi^2=22,579$; $p=0,001$			

Source: Authors' calculations

The results indicate that younger and middle-aged respondents displayed greater variation in their attitudes, whereas older respondents were generally more inclined to consider purchasing discounted food as an acceptable practice. This finding may reflect older consumers' tendency to view promotional offers primarily as an opportunity for more economical household budget management. These

results are consistent with Aschemann-Witzel et al. (2015), who identified promotional discounts as one of the principal drivers of purchasing food in quantities exceeding actual household requirements. Likewise, Stancu et al. (2016) emphasized that buying food solely because it is discounted may lead to the accumulation of surplus food and ultimately increase the likelihood of household food waste, particularly when such purchases are not accompanied by adequate meal planning and food management practices.

Further analysis revealed significant differences between respondents' age and their attitudes towards the statement that they usually consume leftover food either in its original form or after repurposing it ($p < 0.05$) (Table 5).

Table 5. Chi-square analysis of respondents' age and attitudes towards the reuse of leftover food

		I usually consume leftover food as it is or after repurposing it.			Total
		Negative attitude	Neutral attitude	Positive attitude	
Age	Up to 30 years	5	8	68	81
	31–45 years	32	7	54	93
	46–60 years	7	2	18	27
	Over 60 years	2	0	3	5
Total		46	17	143	206
$\chi^2=21,440$; $p=0,002$					

Source: Authors' calculations

The findings demonstrate that positive attitudes towards reusing leftover food were predominant across all age groups. However, this attitude was particularly pronounced among respondents younger than 30 years and those aged between 31 and 45 years. These findings are consistent with previous research indicating that the utilization of leftover food is among the most frequently adopted household strategies for reducing food waste (Principato et al., 2015). Furthermore, Schanes et al. (2018) emphasize that the reuse of leftover food represents a fundamental component of responsible household food management, as it directly contributes to reducing food waste while promoting more efficient use of available resources.

The Chi-square test also identified statistically significant differences between age groups regarding respondents' attitudes towards proper storage of leftover food in order to prolong its shelf life ($\chi^2 = 24.961$; $p < 0.001$) (Table 6).

Table 6. Chi-square analysis of respondents' age and attitudes towards proper food storage

		I properly store leftover food to prolong its shelf life.			Total
		Negative attitude	Neutral attitude	Positive attitude	
Age	Up to 30 years	7	3	71	81
	31–45 years	28	12	53	93
	46–60 years	7	2	18	27
	Over 60 years	0	0	5	5
Total		42	17	147	206
$\chi^2=24,961$; $p=0,000$					

Source: Authors' calculations

Although positive attitudes dominated across all age categories, respondents aged 31–45 years were somewhat more likely to express negative attitudes than participants belonging to the other age groups. These findings correspond with those reported by Stancu et al. (2016), who identified appropriate food storage and monitoring product expiration dates as among the most important determinants of household food waste prevention. Similarly, Aschemann-Witzel et al. (2015) argued that insufficient knowledge regarding appropriate food storage practices frequently leads to premature food spoilage and unnecessary disposal of edible products.

The next stage of the analysis examined whether respondents' willingness to share surplus food with family members, friends, or through donations differed across age groups (Table 7).

Table 7. Chi-square analysis of respondents' age and attitudes towards sharing surplus food

		I share surplus food with family, friends or donate it.			Total
		Negative attitude	Neutral attitude	Positive attitude	
Age	Up to 30 years	14	6	61	81
	31–45 years	41	6	46	93
	46–60 years	8	2	17	27
	Over 60 years	0	2	3	5
Total		63	16	127	206
$\chi^2=21,777$; $p=0,001$					

Source: Authors' calculations

Based on the results shown in Table 7, it can be observed that there is a statistically significant difference between respondents' age categories and their attitudes regarding the statement that they share larger quantities of leftover food with family, friends, or donate it ($p < 0.05$). Respondents aged 31 to 60 years were more inclined to have a negative attitude towards this statement compared to the youngest and oldest respondents. The obtained results are in accordance with the findings of Schanes et al. (2018), who point out that sharing food surpluses represents one of the effective strategies for reducing food waste in households. Also, Aschemann-Witzel et al. (2015) state that social norms, family habits, and the development of local donation mechanisms are significant factors that influence consumers' willingness to give away food surpluses to others instead of throwing them away.

The results of the Chi-square test showed no statistically significant difference between respondents' age groups and their attitudes towards the statement that they usually plan their shopping in advance by preparing a shopping list and checking food supplies at home ($p > 0.05$). This finding suggests that shopping planning is equally common among respondents of different ages. According to Principato et al. (2015), preparing shopping lists and checking existing household food supplies are among the most effective practices for preventing excessive purchasing and reducing household food waste.

Similarly, the results of the Chi-square test showed no statistically significant difference between respondents' age groups and their attitudes towards the statement that they usually plan their meals several days in advance ($p > 0.05$). These findings indicate that this practice is similarly prevalent across all age groups. Likewise, Stancu et al. (2016) reported that meal planning represents an important mechanism for promoting more rational food consumption and reducing household food waste, regardless of consumers' age.

Finally, similar to the previous findings, the results showed no statistically significant difference between respondents' age groups and their attitudes towards the statement that they try to purchase only the food required for planned meals to avoid food waste ($p > 0.05$). This finding suggests that awareness of the importance of rational food purchasing is present regardless of respondents' age. Aschemann-Witzel et al. (2015) emphasized that purchasing food quantities in accordance with actual household needs represents one of the key prerequisites for reducing food waste and promoting sustainable consumption.

4 Conclusion

The present study examined consumers' attitudes and behaviours regarding household food waste among residents of the South Bačka District (Autonomous Province of Vojvodina, Republic of Serbia), with particular emphasis on the influence of age. The findings reveal both behavioural patterns that are common

across the study population and age-related differences in specific food waste practices. Attention was given to respondents' intentions to reduce food waste, the reuse of leftover food, food storage practices, and the management of surplus food.

Overall, the results indicate that respondents demonstrate generally positive attitudes towards food waste prevention and the adoption of responsible consumption practices. Most participants expressed a clear intention to minimize food waste, reported proper food storage practices, and indicated that they regularly utilize leftover food. These findings suggest a relatively high level of awareness regarding the importance of responsible household food management. At the same time, however, unplanned food purchases and purchasing larger quantities of discounted food remain common behaviours that may contribute to the generation of household food waste.

The Chi-square analysis further demonstrated that age is a significant factor influencing several food waste-related attitudes and behaviours. Statistically significant differences were identified regarding respondents' intention to avoid wasting food, purchasing larger quantities of discounted food, the reuse of leftover food, proper food storage, and the sharing of surplus food with family members, friends, or through donations. In contrast, no statistically significant age-related differences were observed with respect to unplanned food purchases, purchasing excessive quantities of food, shopping list preparation, meal planning, or purchasing food according to planned household needs. Taken together, these findings suggest that while certain aspects of responsible household food management are influenced by consumers' age, other sustainable consumption practices appear to be consistently adopted across all generations. Therefore, age should be considered an important, although not exclusive, determinant of food waste-related attitudes and behaviours.

The findings of this study provide valuable insights into the behavioural factors associated with household food waste and may serve as a useful evidence base for the development of educational programmes, awareness campaigns, and public policies aimed at promoting sustainable consumption and reducing household food waste among different age groups.

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Conflict of interest

The authors declare that they have no conflict of interest.

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