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RESEARCH ARTICLE

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Multigenerational differences in harvesting and use of wild edible fruits and nuts in the South Caucasus

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Societal Impact Statement

Ecosystem services are underpinned by biodiversity, which is rapidly eroding globally, threatening rural livelihoods and culture. Examining the uses of wild edible plants (WEPs) that are important to rural communities gives insight into the value of a biodiverse landscape to local communities. Here, the importance of considering age groups in future ethnobotanical and conservation studies is highlighted, as this can enhance our understanding on the dependence of use within a landscape, informing more inclusive conservation actions.

Summary

- Wild edible plants (WEP) remain an important aspect of many rural communities across the world, yet the decline in the diversity and knowledge of WEP use is becoming a global concern. In the Biodiversity Hotspot of the Caucasus, there is few cross-cultural and multigenerational comparisons of plant uses, limiting our knowledge of resource use and dependence within biodiverse landscapes.
- Here, we investigate the patterns of use for wild edible fruits and nuts in the South Caucasus, focusing on multigenerational differences in harvesting patterns, diversity and use through semi-structured interviews in Armenia and Georgia. We calculated use values (UV) for each genera harvested and compared the diversity of genera used between age groups. Pearson chi-square was used to explore the relationship between age-groups and genera harvested.
- We found 53% of rural population ($n = 220$) actively harvest from wild populations, with older age groups harvesting the highest diversity of plants. Twenty-four species from 16 genera are harvested, with *Berberis vulgaris* L. and *Rosa canina* L. shared between both communities. The association between age and diversity of harvested genera was significant ($\chi^2_{[48,\ N\ =\ 506]} = 114.75$, $p < .01$), mainly driven by a strong positive association with *Berberis* spp. L., *Crataegus* spp. L. and *Ribes* spp. L. with the under 18s and *Prunus* spp. L. with under 35s. Young

harvesters used WEP for income generation, while medicinal use increases across older age groups.
- Foraging activities within South Caucasus' communities remains active; however, the use of WEP is not uniform within and across different communities.

KEYWORDS
conservation, ethnobotany, rural communities, South Caucasus, use value, wild edible plants, wild harvesting

1 | INTRODUCTION

Wild plant foods have been important throughout human history and remain important to many forager communities today (Bharucha & Pretty, 2010; Borelli et al., 2020; Hunter et al., 2019). Wild edible plants (WEP) are harvested for a diversity of reasons, from their nutritional and cultural role within local cuisines to their importance for sustenance during periods of food insecurity, for example, widespread famine, during and/or after wars, global pandemics (e.g. COVID-19) and other major socio-economic changes (e.g. colonialism, industrialisation, globalisation, etc.) (Lulekal et al., 2011; Pawera et al., 2017; Ulian et al., 2020; Sõukand et al., 2021; Aceituno-Mata et al., 2021; Pieroni et al., 2021; Prüse et al., 2021; Nataliya Stryamets et al., 2022). Aside from an important food source, many edible plants also have other uses, such as fibre, medicines and pest control (Aceituno-Mata et al., 2021; Ulian et al., 2020). The recent rise in global malnutrition and a dependence on a small pool of crops has highlighted the importance of WEP and other neglected and underutilised species for diversifying our diets, increasing nutrition and creating a more sustainable food system (Borelli et al., 2020; Hunter et al., 2019; Ulian et al., 2020). A global review of wild fruits showed they are often underutilised but are nutritionally rich in antioxidants and play an important role in achieving balanced diets (Sivakumar & Bvenura, 2017).

Unfortunately, traditional plant uses are disappearing in many communities globally. A variety of factors contribute towards this decline, including acculturation (e.g. Mattalia et al., 2020; Stryamets et al., 2022), increased reliance on introduced foods and modern medicines (e.g. Mattalia et al., 2021), urbanisation/reduction in time spent in wild areas (e.g. Aceituno-Mata et al., 2021), loss of local languages (e.g. Turner & Turner, 2008) and limited intergenerational knowledge transfer (e.g. Gallois et al., 2015). In communities where wild plant use is still maintained, the regularity of wild plant use has been reduced over time. For example, in the Chhota Bhangal region in the Western Himalayas, a study found that although 50% of those responded still continue to use WEPs, 36% reported a decline over a 5- to 10-year period (Thakur et al., 2017). Alongside the overall decline, there are also reports of a reduction in the diversity of plants being used (Reyes-García et al., 2015) and the proportion of the community actively harvesting, typically restricted to women and/or older generations (Łuczaj et al., 2012; Schunko et al., 2015). The reduction in frequency, diversity and proportion of community practising wild plant use would inevitably lead to the fragmentation of knowledge of plant use, potentially affecting the retention of traditional plant knowledge into the future, thereby reducing the perceived value of wild plants to rural communities.

The South Caucasus has high cultural, religious and linguistic diversity, along with a strong heritage of plant use for food and medicine (Pieroni et al., 2021; Zazanashvili et al., 2020). Fruits and nuts are intrinsically linked to the culture of many communities across the Caucasus and have a long history of use (Bussmann, 2017). Although the Caucasus has experienced some degree of homogenisation in relation to the diversity of plants used through centralisation during the Communist era, various studies still identify distinct diversity of both taxa and uses among different communities across the Caucasus (Pieroni et al., 2020, 2021; Sõukand & Pieroni, 2019); however, to date, there have been few cross-cultural and multigenerational comparisons (Pieroni et al., 2021). In a region where culture and the natural environment are both diverse and intrinsically linked, a clear understanding of the utilisation of WEPs and the degree of dependence of those living within the landscape is needed for the continued retention of local cultural identity, livelihoods and local biodiversity.

In this study, we explore the patterns of wild edible fruits and nuts harvested and used across different age groups in rural Armenian and Georgian communities. We investigate whether harvesting activities are retained by younger generations and explore if harvested plant genera diversity is linked to the age of the collector. Finally, we seek to understand how WEPs are used across different age groups within this biodiverse landscape.

2 | METHODS

2.1 | Community surveys

The study was conducted in two rural communities, one based in Georgia and the other in Armenia, both of whom were part of a larger Darwin Initiative-funded programme focused on enhancing livelihoods through the conservation of wild harvested plants (Figure 1). The Mchadijvari community, home to around 944 residents (National Statistics Office Georgia, 2014), lies within the Mtskheta-Mtianeti region in the north-eastern part of Georgia, with good road access to the main city of Tbilisi. The Khachik community, by comparison, is slightly smaller, with around 765 residents (Khachik Community Development Program for period 2017–2021) and located within the

FIGURE 1 Map showing the locality of target community in Armenia (Khachik) and in Georgia (Mchadijvari) within the South Caucasus. Semi-structured interviews were conducted to gather data relating to the frequency and use of wild harvested fruit and/or nut species across different demographics of each community. Guided questions for each community can be found in Supporting Information (Notes S1 and S2).

Vayots Dzor region in the south of Armenia. Although both are highland communities, Khachik is more remote compared to Mchadijvari and further from the main capital city of Yerevan. The Khachik community also sits close to the disputed border with neighbouring Azerbaijan. Both communities have warm, continental and dry climates (Bussmann et al., 2017).

Although the language and teams conducting the interviews differed between communities across two countries, we ensured a level of consistency was maintained between the interviews through guided questions. Interviews were conducted during the month of September in 2018 with 220 people (Armenia: 44 people, Georgia: 176 people). Selection of interviewees was undertaken using social research methods. Initially, the in-country teams worked in two to four person teams and divided the village into specific areas for each interviewer to target and selected households based on convenience and willingness of participants. The interviewer would also ask the willing interviewee to identify any other members of the community within the area who also participated in wild harvesting and make relevant contact (e.g. snowball technique) (Bernard, 1988). Interviewees consisted of 196 adults and 24 children (<18 years old). Although the teams aimed to target a 50:50 ratio of males and females, the timing when interviews could take place meant that the responses were female biased (Armenia: 28 women, 16 men; Georgia: 108 women, 68 men). Interview questions followed three distinct themes: (1) demographic, (2) harvesting related and (3) use related (Notes S1 and S2). We used broad age classes (0–18; 19–35; 35–55 and 55+) during the interviews as this was culturally appropriate.

Species used by the community were identified by local taxonomists from the Institute of Botany, Armenia, the Institute of Botany, Georgia, and the National Botanical Garden of Georgia, in the field guided by local harvesting groups, identifying harvested material at their homes and through photos of plants/parts of plants. Herbarium vouchers and seed collections were taken as part of the Darwin Initiative funded project 'Enhancing rural Caucasian community livelihoods through fruit and nut conservation' (Project Ref: 25-017). The Georgian herbarium vouchers were deposited at the National Botanical Garden Georgia, bearing accession numbers CRSB: 1587 to CRSB: 1660. The Armenian herbarium vouchers were deposited at the Institute of Botany of Armenia with the voucher numbers AsP-273 to AsP-317. Original collections of seeds were deposited in the national seed banks in-country, with duplicate collections sent to the Millennium Seed Bank in West Sussex, UK.

2.2 | Data analysis

To control for synonyms and ambiguous species names across the two sites in Georgia and Armenia, we conducted subsequent analysis

at the generic level, following the accepted genus names from the World Checklist of Vascular Plants. We analysed the effect of sampling effort (i.e. the number of people interviewed) on the genera reported as harvested using a rarefaction curve. The curve is created by randomly re-sampling the pool of minimum samples several times and plotting the average number of genera found in each age group. We used an inverse Simpson's Diversity Index to explore the diversity of genera harvested between the different age groups. Although typically used in community ecology, the inverse Simpson's Diversity Index can also be useful in social studies, as it accounts for both the number of genera harvested (richness) and the relative abundance of each genus (evenness) (Magurran & McGill, 2011). Smaller values show a lower number of genera harvested and dominance of a small number of genera.

To understand the level of importance of a given genera to those harvesting it, we calculated its use value (*UV*), which is the total number of reports for that genus divided by the total number of interviewees (Rossato et al., 1999). A Pearson chi-square test was used to understand the relationship between age of collector and the genera most harvested. Simulated *p*-value was computed by Monte Carlo simulation (Hope, 1968) with 2000 replicates.

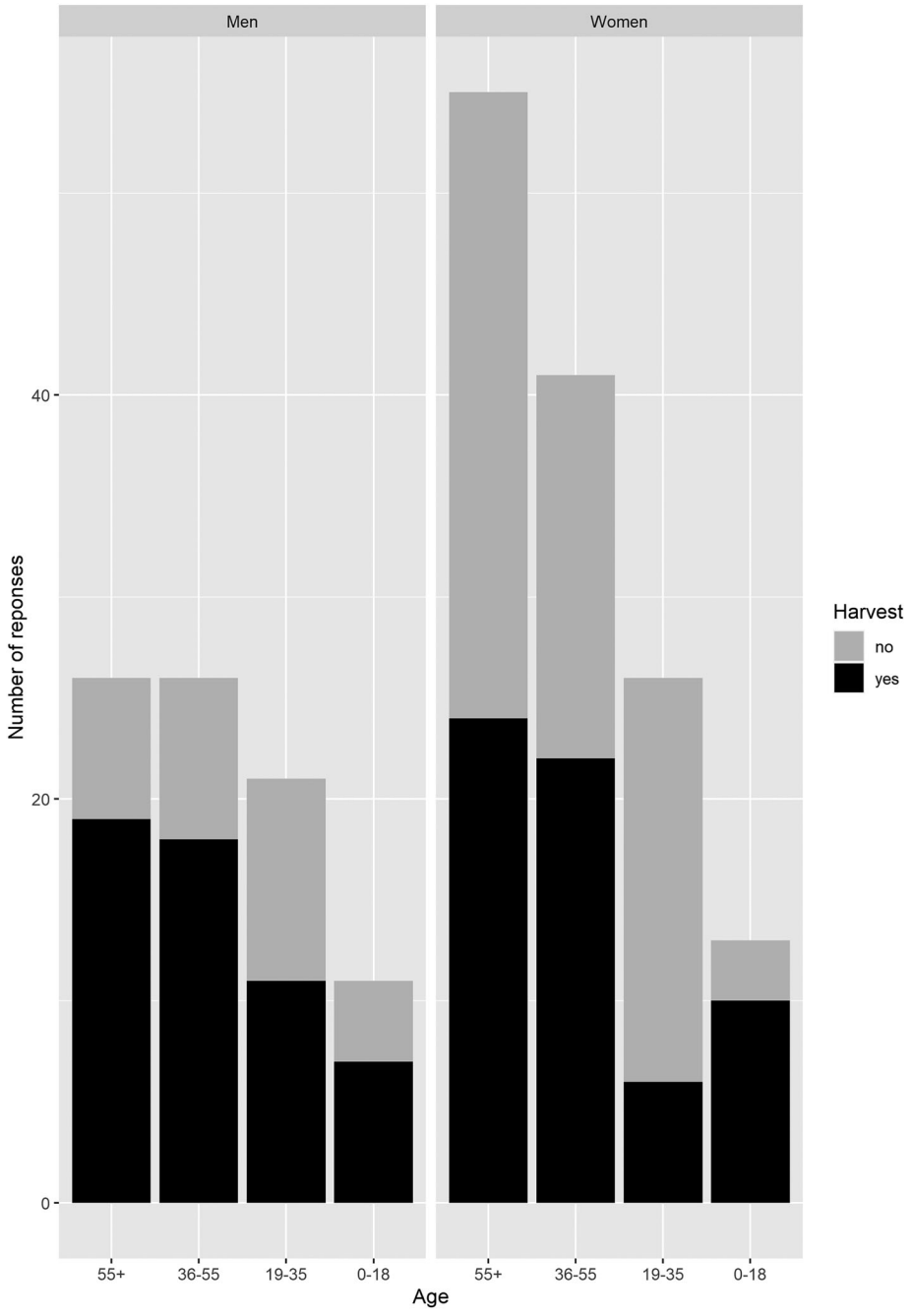

FIGURE 2 Bar chart showing the total number of people from the target communities of Khachik (Armenia) and Mchadijvari (Georgia) who responded to the interview question on whether they harvested fruit and/or nuts from wild populations (yes = 117; no = 103) split between gender (men/women) and aged groups (55+, 36–55, 19–35 and 0–18 years old). Each bar is split between those responded 'yes' (black) and 'no' (grey) when asked if they harvested fruits and/or nuts from wild populations. Numbers above each bar represents total people interviewed for each age group.

TABLE 1 Plant species organised by families harvested by local communities in Armenia (Khachik) and Georgia (Mchadijvari) represented in dark grey. Typical uses of each species based on four use categories (food/diet, income/selling, medicine and other) are also shown for each community. Species names are reconciliated through the World Checklist of Vascular Plants (WCVP). Species highlighted in bold text are those found to be used in both communities.

	Harvested		Use categories							
			Khachik (Armenia)				Mchadijvari (Georgia)			
	Khachik (Armenia)	Mchadijvari (Georgia)	Food/ diet	Income/ selling	Medicine	Other	Food/ diet	Income/ selling	Medicine	Other
Berberidaceae Juss.										
***Berberis vulgaris* L.**	■	■	■	■	■		■		■	
Betulaceae Gray										
Corylus avellana L.		■					■			
Cornaceae Bercht. & J.Presl										
Cornus mas L.		■					■	■	■	
Elaeagnaceae Juss.										
Hippophae rhamnoides L.		■							■	
Fagaceae Dumort.										
Quercus petraea subsp. *polycarpa* (Schur) Soó		■								■
Grossulariaceae DC.										
Ribes orientale Desf.	■		■							
R. biebersteinii Berl. ex DC.	■		■							
Juglandaceae DC.ex Perleb										
Juglans regia L.		■					■	■	■	
Malvaceae Juss.										
Tilia dasystyla subsp. *caucasica* (V.Engl.) Pigott		■							■	
Rosaceae Juss.										
Crataegus orientalis (Mill.) M. Bieb.	■		■	■	■					
Crataegus caucasica K. Koch		■					■	■	■	
Crataegus germanica (L.) Kuntze		■					■			
Malus orientalis Uglitzk.		■					■	■	■	■
Prunus cerasifera Ehrh		■					■	■	■	
Pyrus salicifolia Pall.	■		■	■	■					
Pyrus megrica Gladkova	■		■	■	■					
Pyrus communis subsp. *caucasica* (Fed.) Browicz		■					■	■	■	■
Rosa hemisphaerica Spreng.	■		■	■	■					
Rosa spinosissima L. var. *spinosissima*	■		■	■	■					
***Rosa canina* L.**	■	■	■	■	■		■	■	■	
Rosa iberica Steven	■		■	■	■					
Rubus idaeus L.		■					■	■	■	■
Viburnaceae Raf.										
Sambucus nigra L.		■					■		■	
Viburnum opulus L.		■							■	
Total count	**10**	**16**	**10**	**8**	**8**	**0**	**12**	**8**	**13**	**4**

3 | RESULTS

3.1 | Harvesting patterns

Of those who agreed to be interviewed, 53% said they actively harvest fruit and nut products from wild populations. Of the men that were interviewed, 65% said they actively harvested WEPs from the natural landscape, while slightly less women did so (46%). Indeed, the proportion of men actively harvesting WEPs was higher compared to those who did not across all the age groups. For women, we found that those in the youngest age bracket (0–18 years old) had a higher proportion who actively harvest (77%) compared to those did not, while the 19–35-year-olds showed the lowest harvest to non-harvest ratio (yes = 23%; no = 77%). Overall, those within the above 35s age brackets tended to be more active at harvesting activities compared to those below 35 (Figure 2).

Most respondents actively harvested WEPs in the 'surrounding area of the village', and mainly recognised themselves as 'individual foragers' and/or foraged with others in small groups (two to three persons). During the interviews, we recorded a total of 361 use reports of 24 wild harvested species belonging to 16 genera from 10 families (Table 1). The most species harvested belonged to the Rosaceae (13 species). At the genera level, *Rosa* spp. L., *Rubus* spp. L. and *Crataegus* spp. L. make up approximately 85.4% of all the fruit and/or nut plants harvested from wild populations for the Khachik and Mchadijvari communities. *Rosa* spp. L. was the most harvested wild plant genus overall (33% reported use), followed by *Rubus* spp. L. (26%) and *Crataegus* spp. L. (25.9%). For *Rubus* spp. L., the overall use value is largely driven by the Georgian community, as this genus was not recorded by the Armenian community. Alternatively, *Crataegus* spp. L. use value is driven by a higher recorded use in Armenia (26.8%) compared to Georgia (19.9%). Only two species were harvested by both communities: *Berberis vulgaris* L. and *Rosa canina* L. (Table 2).

Interviewees that were over 55 years old harvested the highest number of genera (15 different genera), followed by the interviewees within the 36–55-year-old age bracket (14 different genera), 19–35-year-old age bracket (10 different genera) and the 0–18-year-old age bracket (nine different genera). Rarefaction curves show a typical rapid increase for each age group, but as more people are interviewed, the curve's gradient reduces (Figure 3). For the older age groups, the curve starts to plateau at 150 interviewees, while the curve for those within the 19–35-year-old age bracket plateau much earlier (~50 interviewees). For the youngest age group, although the gradient of the curve starts to reduce, it does not plateau for the maximum number interviewed. The inverse Simpsons' Diversity show the youngest age group (0–18-year-olds) had the lowest diversity index ($D_{[n = 58]} = 4.34$), despite only having one less genus than those within the 36–55-year-old age bracket. The rest of the age groups had largely similar index values (19–35: $D_{[n = 94]} = 7.21$; 36–55: $D_{[n = 159]} = 7.26$; over 55 s: $D_{[n = 186]} = 6.86$).

We analysed the genera used by both communities to identify differences between harvest and age groups. We found a statistically significant association between age and the types of plants that were harvested by both communities ($\chi^2_{[48,\ N = 506]} = 114.75$, $p < .01$). *Berberis* spp. L., *Crataegus* spp. L. and *Ribes* spp. L. showed strong positive associations with under 18 s, but negatively associated with the older age groups (Figure 4a). The positive association between *Ribes* spp. L. and under 18s contributed 11.9% towards the overall chi-square score, followed by *Berberis* spp. L. at 9.53% and *Crataegus* spp. L. at 6.84% (Figure 4b). Together, these cells contributed 28.3% to the total

	Use value		
Genera	Khachik (Armenia)	Mchadijvari (Georgia)	Total across both sites
***Rosa* L.**	36.60%	17.80%	33.60%
Rubus L.	0.00%	20.00%	26.00%
***Crataegus* L.**	26.80%	19.90%	25.90%
Cornus L.	0.00%	13.40%	17.30%
Prunus L.	0.00%	11.50%	13.60%
***Pyrus* L.**	9.90%	7.40%	11.80%
***Berberis* L.**	18.30%	1.60%	8.60%
Juglans L.	0.00%	5.50%	6.40%
Malus Mill.	0.00%	3.30%	3.60%
Corylus L.	0.00%	1.60%	2.70%
Sambucus L.	0.00%	1.60%	1.80%
Quercus L.	0.00%	0.80%	1.40%
Tilia L.	0.00%	0.60%	0.90%
Viburnum L.	0.00%	0.60%	0.90%
Ribes L.	1.40%	0.00%	0.50%
Fagus L.	0.00%	0.30%	0.40%
Hippophae L.	0.00%	0.30%	0.40%

TABLE 2 Use value shown as a percentage for each genus of fruit or nut species harvested by local communities in Armenia (Khachik) and Georgia (Mchadijvari). Reports relating to harvesting herbs (e.g. thyme and mint) were removed from the analysis. Genera in bold are collected by both communities. Genera names are reconciliated using the World Checklist of Vascular Plants (WCVP).

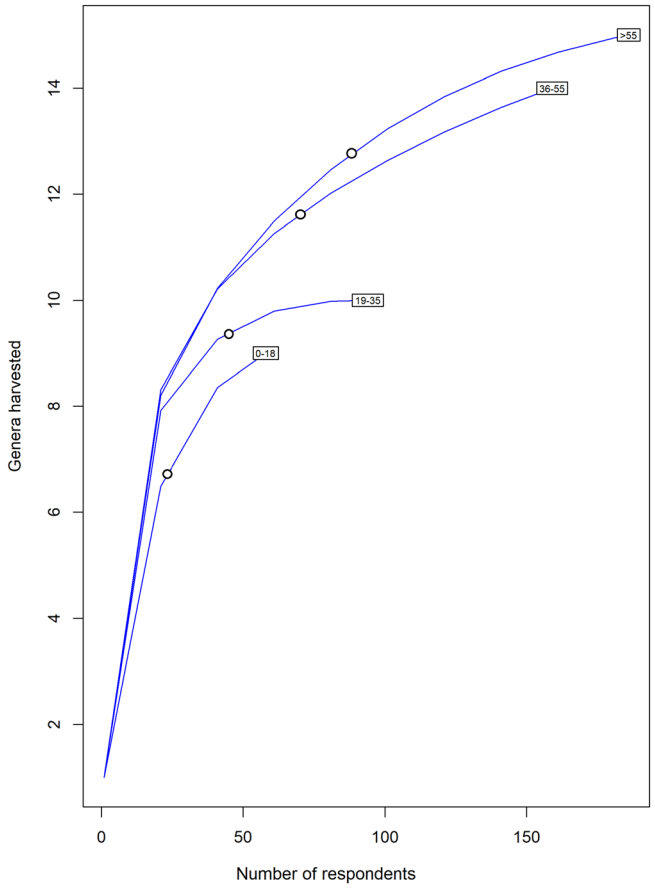

FIGURE 3 Rarefaction curve for each age group (0–18-year-olds; 19–35-year-olds; 36–55-year-olds and over 55s) showing the number of genera harvested against the number of responses for edible fruit and/or nut plants harvested from wild populations in and around the Khachik community in Armenia and the Mchadijvari community in Georgia. Open circles show actual total number of responses per age group, with solid lines showing projected number of genera accumulated as sample size increases, leading to an eventual plateau.

chi-square score, accounting for just under a third of the difference between the expected and observed values. Strong negative associations were found with *Cornus* spp. L. and *Rubus* spp. L. for the 0–18-year-olds, a slight contrast to those within the 19–55 age groups. For young adults (19–35-year-olds), *Prunus* spp. L. contributed the most to the overall chi-square score (7.51%) with a positive association, while in contrast to the younger age group, *Berberis* spp. L. had the highest negative association score (Figure 4a). Older age groups (35 and above) showed little association with any of the plant genera harvested and contributed the least to the overall score (Figure 4a,b).

3.2 | Use categories

Semi-structured interviews revealed 466 use reports of wild harvested fruit and/or nut used by local communities, which broadly corresponded to the following categories: household food, medicine, income/selling and other (mainly ornamental or horticultural use). For the Khachik community in Armenia, household consumption was the main reason for harvesting WEPs (10 species), followed by medicine and income generation having the same number of species each (eight species). All eight species of plants used for medicines are also used for household food, but *Ribes orientale* Desf. and *Ribes biebersteinii* Berl. ex DC. were only used as food. In Georgia, the same number of plants (10) is used for household food as the Armenian community; however, three species (*Hippophae rhamnoides* L., *Tilia dasystyla* subsp. *caucasica* (V. Engl.) Pigott and *Viburnum opulus* L.) were recognised only for their medicinal use (Table 1). Two species were found to be used in both communities (*B. vulgaris* L. and *R. canina* L.), both used for household food and medicine. Only the Armenian community was found to sell fruits of *B. vulgaris* L.

Across different age groups, we also see that many respondents value the harvest mainly for household food, although there are interesting patterns seen between age groups with respect to medicinal use and harvesting for income generation. Use of harvested fruit and nut material for medicine reduces as we go from the older to the younger age groups (Figure 5). Out of the number of recorded uses from the above 55 group, 28% can be attributed to medicine, as opposed to only 9% from respondents within the 0–18 age group. The youngest age group tended to perceive the value of their harvest for sale, with 30% of the response from the interviews highlighting income as the main reason for harvesting within the under 19s. This is greatly reduced for the older generation, where the range of proportion used for income is between 10% (above 55) and 16% (36 to 55).

4 | DISCUSSION

In rural communities in the South Caucasus, strong links between wild plants and people continue to persist. The two target communities from our study showed distinct preferences in relation to the species they harvested and used. Only two species (*B. vulgaris* L. and *R. canina* L.) overlapped between the communities. It is possible that the smaller community and sample size for the Khachik community in Armenia could have limited the capture of more shared species, as the other harvested edible plants (e.g. *Cornus mas* L. and *Juglans regia* L.) are equally as widespread across the region. Our findings are in line with other cross-cultural studies on plant use, whereby even geographically close communities sharing the same or similar landscapes have their own distinct preferences and harvesting patterns (Ghimire et al., 2004; Kazancı et al., 2021; Mattalia et al., 2020; Stryamets et al., 2021; Vitasović-Kosić et al., 2021). Reasons can be linked to historical events (Stryamets et al., 2021) and/or sociocultural backgrounds (Kazancı et al., 2021). However, at the plant family level, Rosaceae was found to be of high importance for harvest within both communities (13 species used). The significance of Rosaceae have been found in other studies in Europe (Kalle & Sõukand, 2013; Miskoska-Milevska et al., 2020), Turkey (Kadioglu et al., 2020) and Russia (Kolosova et al., 2020). Approximately 238 species of Rosaceae have been recorded in Georgia (Davlianidze et al., 2018) with a similar

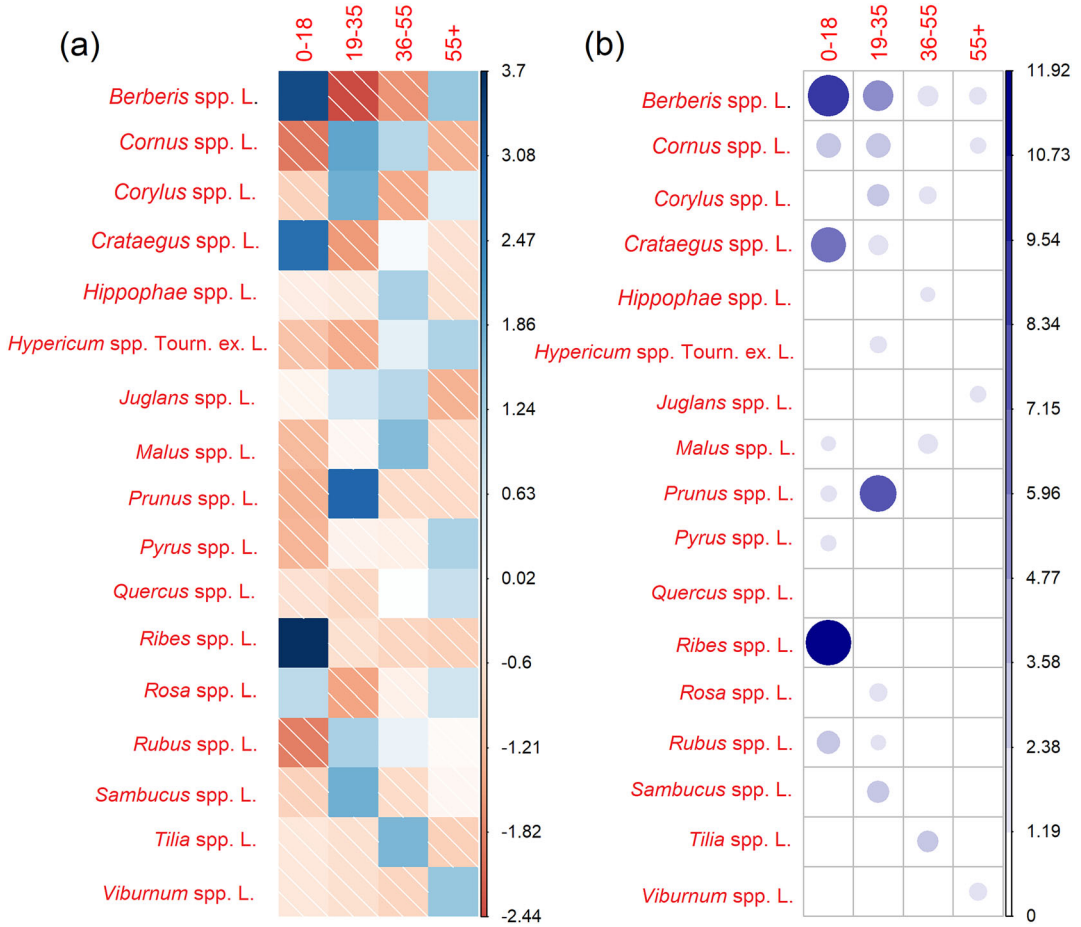

FIGURE 4 The associations between genera harvested (row) against the different age groups (columns) of wild fruit and/or nut harvesters from the Khachik community in Armenia and the Mchadijvari community in Georgia. (a) A visualisation of Pearson's χ2 residuals, where diagonally shaded boxes indicate negative residuals, implying a negative association between the corresponding row (genus) and column (age groups) variables, while non-shaded boxes indicate a positive residual value indicating a positive association between the corresponding variables. Darker colours signify the strength of the dependency between the corresponding variables. (b) The relative percentage contribution of each cell to the total χ2 score, where increasing contributions to the total χ2 score are represented by increasingly darker colours and size of the circles.

number recorded in Armenia (~230 species) (Mulkijanyan & Fedorov, 1958). Given that local communities still utilise a variety of their native species, maintaining this diversity will be important to preserve both the natural and cultural heritage of the region.

Overall, medicines and household foods are frequently mentioned by interviewees as their main reason for collecting. Sixteen out of the 20 species identified as used for household food are also highlighted for medicinal use. The blurring of medicine and food in plants is apparent in many other regions where there is a rich traditional use of plant medicines. For example, in Bangladesh where communities practice Ayurveda medicine, the perception of plants for food or medicine exists within a spectrum and can potentially vary depending on multiple factors related to the user (e.g. age and education), alongside the purpose and taste of the plant itself (Jennings et al., 2015). In the Caucasus region, an example can be seen for roses, which are widely used for making jams and other preserves, while also recognised for their medicinal traits. For example, in Georgia, there is a long-standing tradition of using roses boiled in honey (called *gvilangubini*) as a cure for a variety of ailments (Batsatsashvili et al., 2017). The distinction of certain plants used solely for medicines and/or foods in differing communities in the Caucasus warrants further investigation to understand the traits people associate with different uses for WEPs.

In relation to age, wild harvesting trends found in our two communities largely follow other forager communities, that is, harvesting is largely dominated by the older generation, with the practice less common in children and young adults (Aceituno-Mata et al., 2021; Łuczaj & Kujawska, 2012; Łuczaj & Nieroda, 2011). There are numerous reasons for the reduction in harvesting among the younger generation. Less time spent outdoors (Łuczaj et al., 2012), lack of needing to harvest due to availability of other foods and/or medicines (Mattalia et al., 2021) and/or restricted access to harvesting areas (Narváez-Elizondo et al., 2021) can all contribute towards this decline. Nevertheless, the persistence of WEP harvesting indicates persistence of knowledge of the local landscape and its use across different generations, which is encouraging for the future of traditional knowledge. Traditional knowledge exchange within a community can be complex, with some dominance towards 'vertical' transmission (i.e. parent to child) (García, 2006; Pearce et al., 2011), 'horizontal' transmission

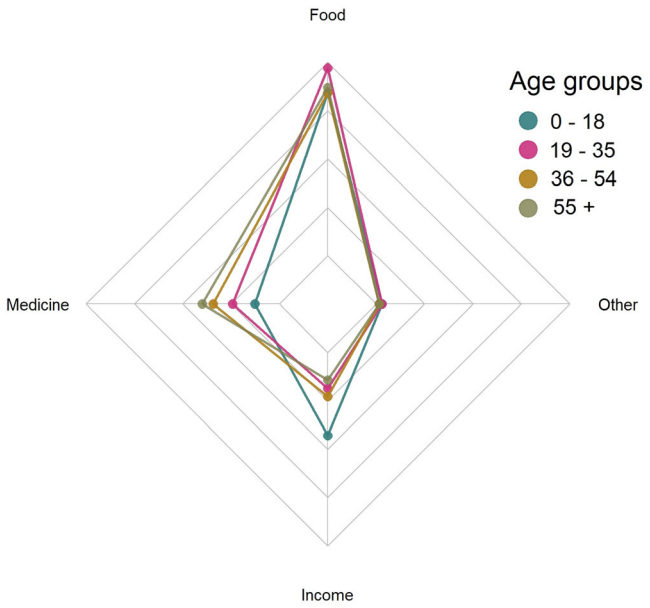

FIGURE 5 Use categories of wild harvested fruit and/or nut species based on age groupings of harvesters from the Khachik community in Armenia and the Mchadijvari community in Georgia depicted in a radar plot. Data used are the proportion per age group (e.g. number of respondents over 55 recording 'food' divided by total number of respondents that are over 55). The axis limit is 0%–70%, with different colours showing the four main age categories.

(peer-to-peer) (Gallois et al., 2018; Lew-Levy et al., 2020) or 'oblique' transmission (i.e. non-familiar and/or media) (Mattalia et al., 2020). Furthermore, knowledge transmission can also be influenced by political histories and/or level of community isolation (Mattalia et al., 2020). Therefore, in a politically challenging region such as the Caucasus, documenting the ethnography of rural foraging communities and the routes of knowledge exchange will be key to the preservation of traditional and cultural knowledge.

Older generations tended to collect more genera and collected more evenly across genera compared with younger generations, potentially indicating a stronger relationship and/or access to wild plants within their landscape. In comparison, under 18s within our current study showed a strong affinity to selected plants, namely, *Ribes* spp. L., *Berberis* spp. L. and *Crataegus* spp. L. We had a low number of respondents within this age group ($n = 24$), and it is likely that increasing interviews would uncover more taxa. However, a similar association pattern is seen between young adults (19–35-year-olds) with *Prunus* spp. L., where the flattening of the rarefaction curve for this age group inferred that we had captured most genera used.

Whether the affinity of young harvesters to selected plants is related to taste, that is, children preferring sweet and/or sour tasting fruits eaten fresh as seen in many parts of Europe (Łuczaj et al., 2012) is unclear from our study, as the lack of association with other plants eaten raw (e.g. *Rubus* spp. L.) contradicts this hypothesis. We did, however, find some indication relating to income associated with the motivations for collecting by younger age groups. Although selling of wild harvested produce is common practice in the region, typically by roadsides and local produce markets, there is also an increasing interest for wild harvested plants being sold commercially in shops and restaurants. The drive in the collection of specified plants that are commercially popular can be seen as a positive (Svanberg & Ståhlberg, 2021), that is, increasing the value of wild plants, but can equally increase risks of overexploitation (Giraud et al., 2021; Łuczaj et al., 2012; Reyes-García et al., 2015). Given the distinction in uses across age groups found in our study, plans developed to conserve species both at the landscape (e.g. protected areas, sustainable managed zones, etc.) and species level (e.g. ex situ conservation, restoration/reintroduction, etc.) (Dierig et al., 2014) in the South Caucasus will need to take into account age as a sociodemographic variable to ensure the sustainability of any conservation action.

5 | CONCLUSIONS

Our findings highlight the importance of the diverse WEPs to rural communities within the South Caucasus. Although household consumption dominates motivation for harvesting, we found parts of the community, mainly younger harvesters, are also motivated by the generation of income. Differences in species and use were apparent between communities and across generations, reinforcing the need to incorporate age alongside gender and socio-economic status in future plant use studies, and in particular, where such studies will inform conservation action.

AUTHOR CONTRIBUTIONS

Aisyah Faruk and Philippa Ryan conceived and edited the manuscript. Aisyah Faruk and Elinor Breman co-led the project and received funding. Anush Nersesyan, Astghik Papikyan, Sona Galstyan, Emma Hakobyan, Tinatin Barblishvili, Tsira Mikatadze-Pantsulaia, Tamaz Darchidze, Marina Kuchukhidze, Nona Kereselidze and David Kikodze conducted interviews, collected, and processed vouchers. Aisyah Faruk and Ian Willey polished and analysed data. All authors contributed to the writing of the manuscript and approved the final version.

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CONFLICT OF INTEREST STATEMENT

The authors have no conflicts of interest to declare that are relevant to the content of this article.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are openly available in 'figshare' at https://figshare.com/, reference numbers 10.6084/m9.figshare.14980536; 10.6084/m9.figshare.14980533; 31 10.6084/m9.figshare.14980485; 10.6084/m9.figshare.14980404.

ETHICS STATEMENT

Interviews were conducted in line with the Code of Ethics of the International Society of Ethnobiology (International Society of Ethnobiology, 2006). A full description of the overall project (i.e. full disclosure) was verbally disclosed by the project team member conducting the interview prior to questioning, giving space for each interview to seek verbal Prior Informed Consent from all interviewees (see Notes S1 and S2 for list of questions asked during interviews). Interviews were conducted in the respective local languages by Georgian and Armenian teams, by which responses were translated into English for later data analysis.

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SUPPORTING INFORMATION

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