

Comparison of the Dietary Supplements Use in the U.S.
And Developing Countries: 2003-2015

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Abstract

The use of dietary supplements (DS) has increased worldwide. Although a number of studies have described the use of dietary supplements according to different age groups, these studies have not been aggregated and compared. This paper focuses on determining the percentage of use and the reasons behind the use of DS among children, adults and elderly groups in the U.S. and developing countries. The literature was searched to find the studies that quantitatively examined the prevalence of DS use and the varied reasons behind the motivations for the use of DS among the age groups across developed and developing countries. The highest percentage of DS use was found in the elderly group and the lowest percentage was found in the children in the U.S. compared with that of the developing countries. The overall intake of DS was higher in the U.S. compared with that of developing countries. The main reasons behind the use of DS were to improve performance, for supplementing diet and to improve overall health in both the U.S. and developing countries.

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Introduction

Dietary supplements are products proposed to supplement the diet and not substitute for food. Dietary supplements are comprised of vitamins, minerals, herbs or other botanical plants and amino acids. They are available in forms such as tablets, capsules, soft gels and gel caps. Intake of dietary supplements is widespread across the U.S. and developing countries.

The use of dietary supplements has gained attention worldwide. Bailey et al. (2013) stated that one-third of children in the U.S. from infants to adolescents, have been reported to use dietary supplements. According to Dwyer (2013), one study in the U.S. revealed that the most highly consumed dietary supplement was multivitamin-mineral (84%) in children younger than 18 years of age. However, Radimer et al. (2004) & Bailey et al. (2011) reported that the DS use was common among U.S. adults and elderly who utilize a higher intake of dietary supplements than young adolescents. Women show a higher intake than men and the use of dietary supplements increases as the level of education increases.

According to the National Health and Nutrition Examination (NHANES) survey 2003 to 2006 (cited in Bailey, 2010), 53% of the American adults use at least one dietary supplement. Bailey et al. (2011) stated that NHANES 2003 to 2006 data indicated a significant increase in the DS use from the NHANES 1999 to 2000 data and also NHANES 2003 to 2006 data showed that DS use was associated with weight status, education, and race/ethnicity. Individuals with obesity took fewer DS (48%) than overweight (57%) or normal-weight individuals (56%). DS use was highest (61%) in individuals with more high school education and lowest (37%) in those with low high school education. Non-Hispanic whites reported higher (59%) DS use than non-Hispanic blacks (36%) or Mexican Americans (34%).

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Intake of dietary supplements in the developing countries has drastically increased. Park & Kim (2012) reported that children in developing countries such as Korea, require DS to overcome nutritional deficiencies. Most of the DS were classified as functional health foods, hence if the efficacy and safety have not been appropriately examined, there could be possibility of the risk of side effects due to abuse, as well as wasted expense. Lutter & Rivera (2003) reported that there was a risk of nutritional susceptibility in children due to lack of poor intake of nutrients. Developing countries experience the problem of nutritional deficiency, and the use of dietary supplements has increased drastically. Park & Kim (2012) reported that in Korea the age group with the highest dietary supplement intake was children 2 to 6 years. Dong Soo Kang & Kun Song Lee (2014) states that the highest intake of dietary supplements in Korea was observed in the preschool children aged five. However, the intake of dietary supplements may differ between different cultures.

According to de Silva et al. (2010) the use of dietary supplements was widespread among Srilankan adult athletes. According to Brown & Wyon (2014) an international study on DS use in dancers from 53 countries reported that the most commonly used dietary supplements were vitamin C (60%), multivitamins (67%) and caffeine (78%). Despite the fact that various studies have described dietary supplement utilization, this paper presents a systematic literature review of data from 2003 to 2015, describing the comparison of the use of dietary supplements across developed and developing countries. It is important to know the reasons motivating the use of dietary supplements among different age groups. The primary demographic factor considered was age with comparisons between children, adults and the elderly. The research does not focus on one dietary supplement or on any specific use.

Background

According to Bailey (2013) the primary reason for using dietary supplements by children in U.S. was to change general wellbeing and by U.S. adults was to improve and maintain overall health. Multivitamins with minerals were the most widely used supplements in the United States. Dwyer (2005) reported that most users of dietary supplements say their fundamental motivation was to enhance general wellbeing or health or to fill perceived supplement gaps in their dietary intake. Interestingly, Bailey et al. (2013) & Dickinson (2012) contend that the general US populace seems to consume dietary supplements principally for wellbeing reasons with just minor concern toward performance improvement. However, it is important to understand the consumer impression of DS use.

According to NHANES 1999-2000 data (cited in Radimer, 2004), 52% of adults reported the utilization of a dietary supplement, and 35% reported regular utilization of a multivitamin-multimineral (MVMM) products. Sebastian et al. (2007) reported that a large proportion of elderly people in the U.S. do not consume sufficient amounts of vitamins and minerals, including calcium, zinc, magnesium, iron, vitamins A and D, vitamins C and E, and vitamin B-6. Many Americans use medical treatments that are not part of mainstream treatment. According to Stein (2008), nearly 38% of adults and 12% of children in America use alternative medicine and 50% of adults use dietary supplements. The most commonly used are dietary supplements and herbal products such as echinacea, flaxseed oil and ginseng, followed by deep-breathing exercises, meditation, chiropractic therapy, massage, and yoga.

As indicated by Lutter & Rivera (2003) infant and youngsters from 6 to 24 months have the risk of nutritional deficiency as a result of lack of complementary supplements. Developing countries encounter the issue of nutritional inadequacy, especially in iron, zinc, and vitamin B6.

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Hence, we can assume that dietary supplement users believe the supplement to be efficacious, whereas non-users do not. It can be said that people who have not used dietary supplements before may not think dietary supplement will likely be useful for them in the future. Also, the persons who have used dietary supplements before may not believe dietary supplements to be efficacious in future. Thus, it is important to consider the consumer impression for the use of dietary supplements.

According to Chen et al. (2014) dietary supplements enriched with vitamins, minerals, and other substances were consumed in many countries including China. Factors such as being unwell and high household income were significantly related to DS usage. The use of dietary supplements varies in different groups for a diversity of dietary and cultural reasons and economic conditions. Bailey et al. (2011) reported that most published studies on the use of supplements in different age groups have been conducted in the U.S. and only a small number of studies have been conducted in developing countries. This paper presents a systematic literature review describing the reasons for the use of DS among different age groups between the U.S. and the developing countries.

Purpose

The purpose of this research project was to compare the percentage (%) of age groups that uses dietary supplements and the varied reasons behind the use of DS across the developed and developing countries. No previous literature search had been performed previously comparing the difference in the age group usage of DS between the U.S. and the developing countries. The age groups that were considered for the research were children (till 14 years), adults (40-65 years) and elderly people (>65 years). The research does not focus on the young adult groups (18 to 35 years). Many studies have been conducted to know the reason behind the use of DS by the young adults. According to Dwyer (2005) the young adults use DS in order to "promote general health", "

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enhance performance and energy", "treat specific health conditions", "improve nutrition" and to "change their lifestyle".

Methods

The literature was searched to find studies that quantitatively examined the prevalence of DS use in three different age groups. The data were summarized by age, comparing children, adults and the elderly in the U.S. and developing countries. Literature searches were conducted and data was collected from the FDA, WHO, NCCAM websites along with various electronic databases accessed through Eastern Michigan University library resources such as PubMed, Cumulative Index to Nursing and Allied Health Literature (CINAHL), EMBASE, Cochrane Reviews etc. Various meta-analyses and reviews were sourced for information on the use of dietary supplements.

Studies published from 2003 and after were given highest priority. There was no limitation in the searches for the use of a specific dietary supplement or also on any specific indication. To assure that descriptors were all inclusive, examined medical subject headings for "DS", "developed", "developing countries", "aged", "middle-aged", "adults", "young adults" and "children" in PubMed. The keywords selected for the searches included dietary supplements, use of DS, intake of DS, herbal supplements, preschool-children, elderly group, adults, dietary supplement composition, nutrition surveys combined with nutrition, DS, supplement, vitamin, mineral, multivitamins, vitamin C, vitamin E, calcium, iron, amino acid, protein, herb, herbal, sport drink, sport bar, nutraceuticals, food supplements, and food supplementation. Data collected from the above sources were used to examine the reasons behind the DS use. They were also used to make a comparison of the use of dietary supplements in various countries.

Articles were selected for the review if they were written in English, provided the prevalence of dietary supplement use or prevalence could be calculated from data in the article and if they provide the reasons for the use of dietary supplements. Articles were excluded if the

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prevalence of use could not be calculated as a percent of the total sample in the study. Prevalence data were retrieved from the text of the article, tables and from graphs. Where possible, the studies on the use of dietary supplements were separated by sex and different age groups. In several other studies, the study authors had not separated the information accordingly into different age groups in the U.S. and developing countries and so the data were presented as combined. The data were compiled by year to look at if any trends could be recognized. Demographic data including age and geographic area were collected. The age groups that were considered for comparing the use of dietary supplements in this study were children, adults and elderly groups in the U.S. and developing countries.

The searches were done for the U.S. and developing countries. Nearly 300 articles were screened and articles which provided prevalence data were chosen for this research paper. Developing countries such as China, India, Korea, and Nigeria were considered for comparison with the U.S. The searches mainly focused on knowing the consumer impression of using DS, to determine the percentage of each age group that uses dietary supplements and the reasons behind their use. The study titles were examined and abstracts were reviewed if the articles appeared to involve intake of dietary supplements, children, preschool children, aged and adult groups.

Results

The searches through databases and other websites produced nearly 1756 potential publications. Figure 1 shows the number of publications included and excluded in the review.

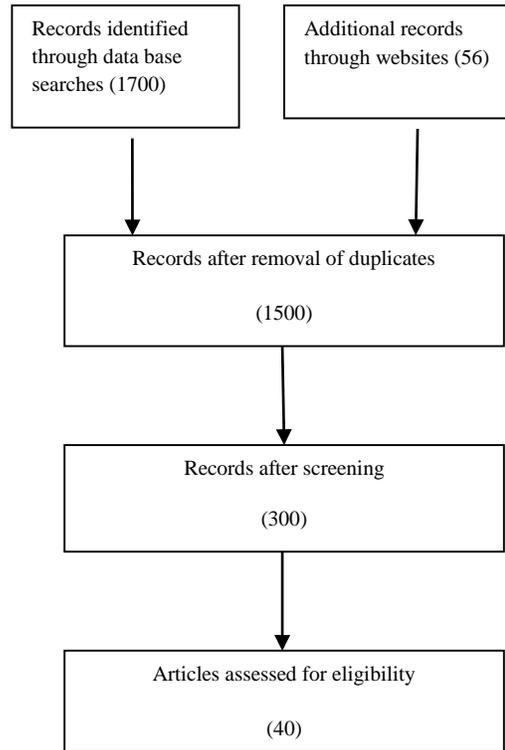


Figure 1: Publications included and excluded during literature review

Use of Dietary Supplements in the U.S.

According to NHANES 2003-2006 data (cited in Bailey, 2010) more than 30% of the children reported the utilization of a dietary supplement in the United States. Radimer et al. (2004) stated that 47% of adults (aged 45-65yrs) and 63% of elderly people (>65 yrs) took more than one supplement. The INTERMAP study conducted by Archer et al. (2004) revealed that on an average 52% of adults use supplements in their life. In the 50 to 59-year age group, 56% used supplements and 48% in the 40 to 49-year age group used supplements. Rock (2007) reported that 56-57% of adults use multivitamin-multimineral (MVMM) products as a dietary supplement. Bailey et al.

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(2011) reported that 49% of the U.S. population aged 1 year and older use dietary supplements. Picciano et al. (2007) reported 32% dietary supplement use in children from birth to 18 years in NHANES 1999-2002, with the lowest use reported among teenagers 14–18 years old (26%), and highest use among 4 to 8 years old children (49%). Park (2008) stated that 38% of adults and 79% of elderly use DS. According to NHANES 2003-2006 (cited in Bailey, 2011) the use of DS was reported by 50% of the U.S. population and 54% of adults aged >40 and 70% of adults ≥ 71 years use dietary supplements. Dwyer (2013) reported that 37% of US children used dietary supplements. Lee et al. (2014) reported that > 40% of patients (age of 48 years) and 84% of elder people with cancer use herbal supplements as dietary supplements.

Bailey et al. (2010) reported that more than one-third (35%) of the U.S. children aged 1–13 years used dietary supplements, and 28% used dietary supplements containing folic acid. Children who used dietary supplements had significantly higher total folate intakes and exceeded the Upper Intake Level (UL) by >50%. Young et al. (2009) stated that almost 80% of hospitalized older patients reported use of DS, with 52% reporting use of non-vitamin/non-mineral DS.

Only 5 unique studies reported on the percentage of use of DS for elderly groups, 7 studies reported for adult groups and 5 studies reported the percentage of use in children in the U.S. Dietary supplements use in all categories increased with age. The average percentage of DS use in the three different age groups was calculated from the data in Table 1. The total percentage of DS use for each age group was multiplied with total no. of years and divided by 100. The highest percentage of use of dietary supplements in the U.S. (49%) was seen in the elderly (>65 years). Some studies did not report the specific reason behind the use of DS. The prevalence data of use

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of DS was high in the elderly than that of the other age groups. Table 1 summarizes the data of DS use in three different age groups in the U.S. based on literature published from 2003 to 2015.

Table 1

Use of DS in different age groups in the U.S.

Author & Year	Children	Adults	Elderly
NHANES (2003-2006)	30%	54%	70%
Radimer et al. (2004)	-	47%	63%
Archer et al. (2004)	-	52%	-
Rock (2007)	-	57%	-
Picciano et al. (2007)	32%	-	-
Park (2008)	-	38%	79%
Young et al. (2009)	-	-	80%
Bailey et al. (2010)	35%	-	-
Bailey et al. (2011)	49%	-	-
Dwyer (2013)	37%	-	-
Lee et al. (2014)	-	40%	84%
Average Percentage	24%	44%	49%

Abbreviations: DS-Dietary Supplements

Note: Age groups: Children - up to 14 years, Adults - 40-65 years, Elderly - >65 years.

Use of DS in the U.S. based on literature published from 2003-2015.

The average percentage represents the mean scores of all age groups.

Use of Dietary Supplements in the Developing Countries

Intake of dietary supplements is widespread in developed countries. Liu et al. (2015) stated that in a population-based cross-sectional study, 84% of a Hong Kong Chinese population aged 65 years and older used dietary supplements. Aina and Ojedokun (2014) reported that 86% of the Nigerian students have used dietary supplements. Over 60% of the students answered "yes" to whether dietary supplements can be used to substitute natural nutrients derived from foods. Yoon et al. (2012) reported that approximately 34% of Korean children and adolescents were taking DS. The factors associated with the DS use were: younger age, higher household income, presence of chronic diseases, regular meal consumption, frequent snack consumption and normal body mass index rather than overweight or obesity. Kim et al. (2013) reported that approximately 45.1% of

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Korean children between 1 and 6 years used DS. In several studies, the rate of intake of dietary supplements were significantly higher for older children.

According to the fifth Korea NHANES 2010-2012 data (cited in Kang & Lee, 2014) the intake rate of dietary supplements was 49.0-54.2% in children from 1 to 6 years old. Park et al. (2003) reported that less than 67% of the Korean elderly use dietary supplements due to "low income". Kang & Lee (2014) reported Korean preschool children took in more DS than preschool children of the United States. Pandian et al. (2012) reported that 68.4% of subjects aged 25-75 years use DS for the treatment of stroke in Asia, particularly in India. According to the 2005 third Korean NHANES data (cited in Lee & Kim, 2009), 21.8% of male and 32.0% of female adult respondents used dietary supplements regularly. The study by Qato et al. (2008), reported that 49% of elderly (>65 yrs) use dietary supplement "on a regular schedule, like every day or every week." A study by Kim, M.K. (2011) on the prevalence of herbal medicine use in the capital area of Korea revealed that about 59.2% of primary school children took DS. A study by Chen et al. (2014) on the prevalence of DS use in healthy preschool Chinese children in Australia and China showed that 22.6% and 32.4% of the Chinese children were taking dietary supplements in Australia and China, respectively.

Only 4 unique studies reported on the percentage of use of DS for elderly groups, 4 studies reported for adult groups and 7 studies reported the percentage of use in children in the developing countries. The average percentage of DS use in the three different age groups was calculated from the data in Table 2. The total percentage of DS use for each age group was multiplied with total no. of years and divided by 100. The highest percentage of use of dietary supplements in the developing countries (43%) was seen in the children. Some studies did not report the specific reason behind the use of DS. The use of DS was higher in the children than that of the other age

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groups. Table 2 summarizes the data of DS use in three different age groups in the developing countries based on literature published from 2003 to 2015.

Table 2

Use of DS in different age groups in the developing countries.

Author & Year	Children	Adults	Elderly
Park et al. (2003)	-	-	67%
Korean NHANES survey (2005)	-	54%	-
Qato et al. (2008)	-	53%	49%
Korean NHANES survey (2010-2012)	54%	-	-
Kim (2011)	59%	-	-
Pandian et al. (2012)	-	68%	68%
Yoon et al. (2012)	34%	34%	-
Kim et al. (2013)	45%	-	-
Aina & Ojedokun (2014)	86%	-	-
Chen et al. (2014)	55%	-	-
Lieu et al. (2015)	45%	-	84%
Average Percentage	49%	27%	35%

Abbreviations: DS-Dietary Supplements

Note: Age groups: Children - up to 14 years, Adults - 40-65 years, Elderly - >65 years.

Use of DS in developing countries based on literature published from 2003-2015.

The average percentage represents the mean scores of all age groups.

Reasons Behind the Use of DS in the U.S.

Bailey et al. (2013) & Dwyer et al. (2013) stated that the main reasons for use of supplements in children in the U.S. were: 41% for overall health promotion, 37% to prevent or treat illnesses and conditions for which there was only limited evidence of their efficacy, 20% to prevent health problems, 23% for supplementing the diet, 37% to maintain health, 14% to boost immunity and 14% for tooth health and cavity prevention. Some authors suggested that intake of DS by adults (56%) in the U.S. was to minimize health issues because supplements contribute to a large nutrient intake. Dwyer (2005) reported that different demographic factors like age, sex, income, education and family would be responsible for the varied use of DS. However, Picciano

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et al. (2007) stated that supplement use among U.S. children was associated with families with higher incomes.

Archer et al. (2005) stated that the reasons behind supplement use among adult groups (52%) included a wish to decrease susceptibility to disease, improve personal health, and avoid dietary deficiencies. Sebastian et al. (2007) stated that sociodemographic factors such as age group, race, smoking status and educational status were related to 80% of supplement use for supplementing the diet by adults aged 51 years and older. Voipio et al. (2015) stated that 72% of adults use DS for treating hypovitaminosis D. Dharmarajan et al. (2005) stated that older adults (54%) consume DS for the treatment of vitamin D deficiency. Park (2008) stated that 38% of adults use DS to treat colds. Table 3 summarizes the reasons behind the use of DS in all the age groups in the U.S. based on literature published from 2003 to 2015.

Table 3

Reported reasons for DS use among all the age groups in the U.S.

Author & Year	Reasons behind the use	Children	Adults	Elderly
Bailey et al. (2013) & Dwyer et al. (2013)	Overall health promotion	41%	-	-
	Prevent or treat illnesses	37%	-	-
	Prevent health problems	20%	-	-
	Supplementing the diet	23%	-	-
	Maintain health	37%	-	-
	Boost immunity	14%	-	-
	Cavity prevention	14%	-	-
Park (2008)	To treat colds	-	38%	-
Sebastian et al. (2007)	Supplementing the diet	-	-	80%
Archer et al. (2005)	Improve personal health	-	52%	-
	Minimize the health issues	-	56%	-
	Decrease susceptibility to disease	-	52%	-
Voipio et al. (2015)	Treating hypovitaminosis D	-	72%	-
Dharmarajan et al. (2005)	Treatment of vitamin D deficiency	-	-	54%

Abbreviations: DS-Dietary Supplements

Note: Age groups: Children - up to 14 years, Adults - 40-65 years, Elderly - >65 years.
Reasons for DS use in the U.S. based on literature published from 2003-2015.

Reasons Behind the Use of DS in the Developing countries.

De Silva et al. (2010) stated that 79% of adults use dietary supplements to improve performance and 19% to improve their overall health status. Lutter & Rivera (2003) stated that vitamins or other supplements recommend use for only those children with chronic diseases, malabsorption, and eating disorders. Brown and Wyon (2014) stated that 48% of supplement use by international dancers was to improve health, boost immunity, and reduce fatigue. Shay et al. (2012) stated that adults (46%) who were at low risk of cardiovascular disease (CV) consume DS. Chiu et al. (2014) reported that 31.8% of the adults (45 years) use DS to treat headaches. Pettifor (2014) stated that in developing countries, children with low calcium intake and poor vitamin D took Vitamin D and calcium supplements to increase bone mass. Park et al. (2003) reported that 75% of the elderly population in Korea use supplements for overall health performance. Chunming (2000) stated that DS intake of Chinese children was mainly for the development and growth of children, particularly in low weight, overweight, and obese children.

Yoon et al. (2012) stated that 34% of Korean children use DS for overcoming chronic diseases. Kim et al. (2013) stated that the factors responsible for the DS use in preschoolers in three Korean cities were to help growth and nurturing for children (31.7%), upgrade health (31%) and supplement insufficient nutrients (19.1%). Pandian et al. (2012) reported that 36.3% of adults aged 40 to 50 years choose to use DS for treating limb weakness, dysphasia, dyslipidemia, hypertension, hemorrhagic stroke, and severe stroke. Aina and Ojedokun (2014) stated that the reasons given by the students were primarily for good health (58.9%), poor diet (35.0%), to boost immunity (34.3%), weight gain (26.1%), energy (26.8%) and compliance to doctor's prescription (16.4%). Table 4 summarizes the reasons behind the use of DS among all the age groups in the developing countries based on literature published from 2003 to 2015.

Table 4

Reported reasons for DS use in all age groups in the developing countries.

Author & Year	Reasons behind the use	Children	Adults	Elderly
Park et al. (2003)	To improve overall health	-	-	75%
De Silva et al. (2010)	Improve performance	-	79%	-
	To improve overall health	-	19%	-
Shay et al. (2012)	Cardiovascular disease	-	46%	-
Pandian et al. (2012)	Treat dyslipidemia	36%	-	-
Yoon et al. (2012)	Treat chronic diseases	34%	-	-
Kim et al. (2013)	Help growth and nurturing	31%	-	-
	Upgrade health	31%	-	-
	Supplement insufficient nutrients	19%	-	-
	Weight gain	26%	-	-
Aina & Ojedokun (2014)	Compliance to doctor's prescription	16%	-	-
	Poor diet	35%	-	-
	To boost immunity	34%	-	-
Chiu et al. (2014)	Treat headache	-	31%	-
	Energy intake	-	-	75%
Brown & Wyon (2014)	Boost immunity	-	48%	-
	Reduce fatigue	-	48%	-
	To improve overall health	-	48%	-

Abbreviations: DS-Dietary Supplements.

Note: Age groups: Children - up to 14 years, Adults - 40-65 years, Elderly - >65 years.

Reasons for DS use in developing countries based on literature published from 2003-2015.

Discussion

Based on the literature published from the year 2003 to 2015, data from Table 1 and Table 2 illustrates that the use of DS was higher (49%) in the elderly group (>65) in U.S. compared to developing countries and the DS use was higher in children (49%) in the developing countries compared with the use of children in U.S.

According to the study by Kim et al. (2013), the rate of DS intake was higher in families with higher income than with lower income. The study by Bailey et al. (2013) on the reason for DS intake reported that the major motivation factor in children was "to improve performance", followed by "to improve overall health". Nearly five to six studies provided information on the reasons why the general population tends to use the DS. The factor "improve performance" was listed as the primary reason with the highest frequency and the factor "to improve overall health" listed as the second most. The study by Aina & Ojedokun (2014), on the reasons given by the students who use dietary supplement, showed that they were aware of the nutritional deficiency and they were also willing to put more effort into maintaining their health. The study by Kim et al. (2014), showed that the increase in the prevalence of use of supplements across the same age group suggests that aging of the population was not the primary reason for the increase. The use of DS increases according to the age group (till 14 yrs, 40-45 yrs and > 65 yrs).

The study by Shaikh et al. (2010), showed that sociodemographic factors influencing supplement use were similar to those affecting health behaviors related to maintaining a nutritious diet, greater physical activity, and healthy body weight. The factors "not working", "never breastfed", "higher education level of the mother" and "older age of the child" were associated with dietary supplement use in healthy Chinese children in Australia. In China, being unwell and "having higher household income" were significantly related to dietary supplement usage.

Use of Dietary Supplements

The common factors that were responsible for the use of DS in the U.S. and developing countries were to improve performance, improve overall health, boost immunity and as diet supplement. However, the reasons behind the use of DS vary among the different age groups in the U.S. and developing countries. It is said that better health creates a better nation. In developing countries, the consumer impression of choosing DS as supplements in their daily lives varies according to their needs. Majority of children in the developing countries take DS for varied reasons compared to the children in the U.S. The use of supplements to treat or prevent specific health conditions was very low in the developing countries. In this study, the analysis indicated that children's primary reasons for the intake of dietary supplements were to improve or maintain health. The data from Table 4 illustrates the major reasons for DS use by children in developing countries were to reduce fatigue, poor diet and to boost immunity whereas the data from Table 3 illustrates the reasons for DS use by children in the U.S. were to improve overall health, to prevent or treat illness and to maintain health. A few percent of children in the U.S. use DS to boost immunity. Irrespective of the reasons, the percentage of DS use by children in the U.S. was less compared to that of the use in the developing countries.

In this study, the analysis indicated that the reasons behind the use of DS by adults and elderly vary in the U.S. and developing countries. The data from Table 3 illustrates that the majority of adults in the U.S use DS for treating hypovitaminosis D, to minimize the health issues, as diet supplement and to improve overall health. From the data in the Table 4 it is shown that majority of adults in the developing countries use DS to improve performance, to reduce fatigue, treat cardiovascular disease and to boost immunity. The use of DS by adults in the developing countries was less compared to the use in the U.S.

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The data from Table 3 illustrate that the majority of elderly in the U.S use DS to improve overall health promotion, to maintain health, diet supplement, to minimize the health issues and to improve personal health. The data from Table 4 illustrates that majority of elderly in the developing countries use DS to cardiovascular disease, as the doctor prescribed and to improve overall health. The data from Table 1 and Table 2 illustrate that DS use was higher in the elderly in the U.S. than in the developing countries. Figure 2 shows that DS use in elderly group was higher in the U.S. than the developing countries.

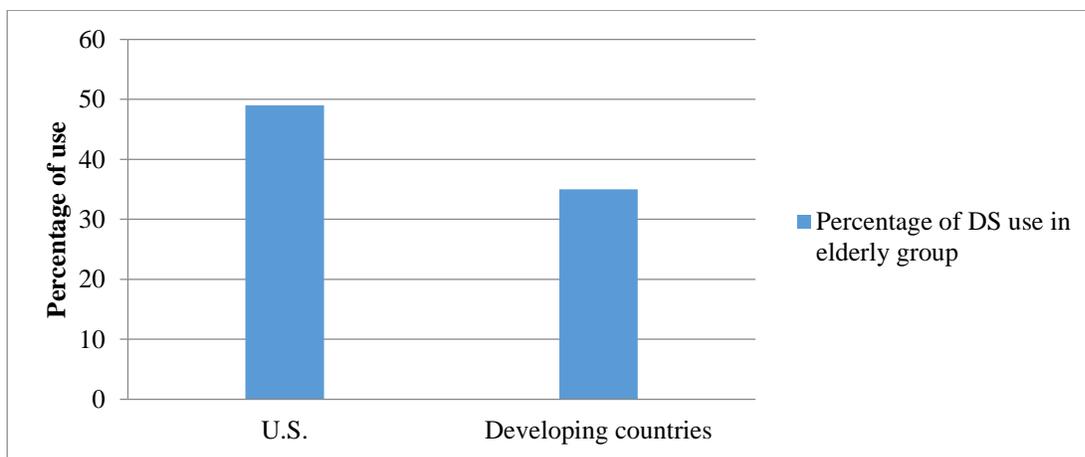


Figure 2: Comparison of DS use in elderly group in the U.S. and developing countries.

Conclusion

The percentage of DS use was high in the elderly (>65 yrs) among the adults and children in the U.S., whereas the DS use was higher in children among adults and elderly in the developing countries. The main reasons behind the use of DS were for supplementing the diet, to improve performance and to improve overall health promotion. The overall use of DS was high in the elderly and low in the children in U.S. when compared with that of developing countries.

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