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Exploring perceptions and beliefs about the cost of fruit and vegetables and whether they are barriers to higher consumption

Kathryn Chapman, BSc, M Nutr & Diet [a, *], David Goldsbury, BSc, MPH [a], Wendy Watson, B App Sc, M App Sc [a], Michelle Havill, BA Psych/B Hlth [a], Lyndal Wellard, B Health Sc, MHP [a], Clare Hughes, BSc, MPH [a], Adrian Bauman, PhD, FAFPHM [b], Margaret Allman-Farinelli, BSc, MPhilPH, PhD [c]

[a] Cancer Council NSW, Sydney, Australia
[b] Prevention Research Collaboration, School of Public Health, University of Sydney, Sydney, Australia
[c] School of Life and Environmental Science in Charles Perkins Centre, University of Sydney, Sydney, Australia

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ABSTRACT

Background: Fruit and vegetable (F&V) consumption is below recommendations, and cost may be a barrier to meeting recommendations. Limited evidence exists on individual perceptions about the cost, actual spending and consumption of F&V. This study investigated perceptions and beliefs about cost of F&V and whether this is a barrier to higher consumption.

Methods: An online survey of Australian adults (n = 2474) measured F&V consumption; expenditure on F&V and food; and perceived barriers to consumption. Multivariable logistic regression examined associations between participants' responses about cost of F&V and demographic factors, and with actual consumption and expenditure on F&V.

Results: Cost was identified as a barrier for 29% of people not meeting recommended fruit servings and for 14% of people not meeting recommendations for vegetables. Cost was a more common barrier for those on lower incomes (fruit aOR 1.89; 95% CI 1.20–2.98 and vegetables aOR 2.94; 95% CI 1.97–4.39) and less common for older participants (fruit aOR 0.33; 95% CI 0.17–0.62 and vegetables aOR 0.31; 95% CI 0.18–0.52). There was no association between the perceived barriers and actual F&V spending. Twenty percent of participants said F&V were not affordable; 39% said cost made it difficult to buy F&V, and for 23% the cost of F&V meant they bought less than desired.

Conclusions: A minority reported F&V were not affordable where they shopped and that cost was a barrier to higher consumption. However, it is apparent that young adults and those on low incomes eat less than they would like because of cost. Strategies that remove financial impediments to consumption are indicated for these population sub-groups.

1. Introduction

Suboptimal fruit and vegetable (F&V) consumption is a global issue with population intakes low in many countries (Hall, Moore, Harper, & Lynch, 2009). The World Health Organization recommends consumption of at least 400 g of fruit and non-starchy vegetables daily (World Health Organization, 2003). Australian Dietary Guidelines recommend eating at least two servings of fruit (approximately 300 g total) and five servings of vegetables daily (approximately 375 g in total) to maintain healthy weight and reduce risk of chronic diseases (National Health and Medical Research Council, 2013). Supporting this recommendation, people who eat at least seven servings each day have a reduced risk of chronic disease and lower mortality (Kypridemos, O'Flaherty, & Capewell, 2014; Nagle et al., 2015; Oyebode, Gordon-Dseagu, Walker, & Mindell, 2014; World Health Organization, 2011). Most

* Corresponding author. Cancer Council NSW, 153 Dowling Street, Woolloomooloo, Sydney, NSW 2011, Australia.
E-mail addresses: kathyc@nswcc.org.au (K. Chapman), davidg@nswcc.org.au (D. Goldsbury), wendyw@nswcc.org.au (W. Watson), michelleh@nswcc.org.au (M. Havill), lyndalw@nswcc.org.au (L. Wellard), clareh@nswcc.org.au (C. Hughes), Adrian.bauman@sydney.edu.au (A. Bauman), margaret.allman-farinelli@sydney.edu.au (M. Allman-Farinelli).

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Australian adults fall short of achieving recommendations for F&V, with one in ten meeting five servings of vegetables daily and half meeting two servings of fruit daily (Australian Bureau of Statistics, 2014).

Cost is a significant influence on food choice (Beydoun, Powell, Chen, & Wang, 2011; Caraher & Cowburn, 2005; Nederkoorn, Havermans, Giesen, & Jansen, 2011; Sacks, Veerman, Moodie, & Swinburn, 2011), and the cost of F&V relative to other foods is one factor that may affect consumption among low socio-economic status (SES) groups (Ball et al., 2015a; Dong & Lin, 2009; Giskes, Avendano, Brug, & Kunst, 2010; Glanz, Basil, Maibach, Goldberg, & Snyder, 1998) and young people (Neumark-Sztainer, Story, Perry, & Casey, 1999; Shannon, Story, Fulkerson, & French, 2002). However a range of other factors may explain lower consumption patterns of F&V. Other barriers to F&V consumption include established personal and family eating habits; incorrect belief of already eating enough; lack of skills in preparation of appealing and convenient F&V dishes; perception that vegetables are time consuming to prepare; and concerns about pesticide residues and genetically modified foods (Pollard, Kirk, & Cade, 2002).

A systematic review found that the most consistent evidence of dietary inequalities was for F&V consumption (Giskes et al., 2010). People from socially disadvantaged groups are less likely to consume the recommended intakes of F&V than those from more advantaged population groups, with F&V consumption positively related to income among both men and women (Ball et al., 2015a; Giskes et al., 2010). Adults with lower incomes tend to consume a smaller variety of F&V than their higher-income counterparts (Giskes, Turrell, Patterson, & Newman, 2002; Glanz et al., 1998; Pollard et al., 2008). In addition, lower-income adults express less desire to increase their consumption (Giskes et al., 2002; Pollard et al., 2008). Some studies have shown people from low SES groups commonly report that F&V cost more in their local areas and are less available and poorer quality, than those from high SES groups (Ball et al., 2015a; Giskes et al., 2010; Giskes, van Lenthe, Brug, Mackenbach, & Turrell, 2007; Turrell, Hewitt, Patterson, Oldenburg, & Gould, 2002). However some other studies have shown food prices (including F&V prices) are not more expensive in low socio-economic compared to high socio-economic areas (Chapman, Kelly, Bauman, Innes-Hughes, & Allman-Farinelli, 2014; Palermo, McCartan, Kleve, Sinha, & Shiell, 2016; Winkler, Turrell, & Patterson, 2006a; Winkler, Turrell, & Patterson, 2006b).

As cost is a known barrier to F&V consumption, effective interventions to increase F&V consumption would benefit from better understanding community perceptions and beliefs associated with the affordability of F&V. There are limited studies that have determined people's perceptions and individual beliefs about the cost of fresh F&V and whether this is associated with their consumption of F&V. Most studies to date have been qualitative explorations through focus group discussions or small sample sizes (for example (Lawrence et al., 2007; Marshall, Anderson, Lean, & Foster, 1995; Webber, Sobal, & Dollahite, 2010; Yeh et al., 2008). These qualitative studies have confirmed individuals take a range of factors into consideration including price, time, health, family preferences, and availability when making food purchases, especially for F&V (Lawrence et al., 2007; Marshall et al., 1995; Webber et al., 2010; Yeh et al., 2008). This study examines personal perceptions and beliefs about cost being a barrier to their purchase of F&V and their association with different demographic factors in order to inform future health promotion and policies. In particular, this study looks at the associations with measures of socio-economic status including personal education level and household income, as well as a measure of relative advantage and disadvantage based on the area of residence.

2. Material and methods

2.1. Survey procedure

An online survey of a representative sample of adults aged 18 years or over living in New South Wales (NSW), Australia's most populous state, was conducted during January and February 2013 as part of a larger Community Survey on Cancer Prevention. The methodology for the survey has been described elsewhere (Buykx, Gilligan, Ward, Kippen, & Chapman, 2015; Chapman et al., 2016).

Email invitations were delivered to 30,179 adult residents of NSW, who were part of an existing market research database, to complete an online survey about 'personal health'. Of these, 5290 commenced the survey screening questions. To reflect the NSW population, quotas were placed on the numbers of participants based on place of residence (metropolitan vs non-metropolitan locations), sex, age, and education. Data on participant's household income, number of children living at home and postcode enabled measures of socio-economic status and urban, rural and remote dwellings to be categorised. To reduce the overall length of the survey and reduce participant burden, participants were randomly allocated to different sections of the questionnaire that focused on modifiable risk factors for cancer (nutrition, sun protection, tobacco control, alcohol). This meant that it took 22 min on average to complete the entire survey. The recruitment of participants is summarised in Fig. 1. Participants received a small financial incentive of AUD$3 to participate by the online market research company, in line with the amount provided for other surveys they administer.

Behavioural questions drew on existing surveys (e.g. NSW Population Health Survey (Centre for Epidemiology and Evidence, 2012)) to allow a number of previously validated questions to be included, and all questions were pilot tested. The current study reports on F&V consumption, and perception of cost as a barrier to higher consumption.

Participants were asked to estimate how many servings of F&V they consumed each day on average, and estimate if their intake was adequate (*too little, about right, too much or not sure*). Participants were not prompted with the recommended servings in the Australian Dietary Guidelines, and their estimation was in relation to their own belief of what is an adequate consumption level. Those who described their F&V consumption as too little were asked to nominate the barriers to them eating more. A number of common barriers, derived from the literature (Glasson, Chapman, & James, 2010; Pollard et al., 2002), were listed and participants could nominate other reasons. Participants were asked to estimate how much their household spent in Australian dollars (AUD$) each week on food, and of this, how much was spent on F&V. All expenditure estimates on food excluded restaurants and takeaways.

Questions relating to perceptions and beliefs about food costs were informed by a number of previous studies (Anderson et al., 2001; Bihan et al., 2010; Dibsdall, Lambert, Bobbin, & Frewer, 2003; Giskes et al., 2009; Inglis, Ball, & Crawford, 2008; Mushi-Brunt, Haire-Joshu, & Elliott, 2007; Yeh et al., 2008). Perceptions and beliefs were explored through two statements with 5-point agree/disagree likert scales - *Fruit and vegetables are affordable in the shop(s) where I buy most of my food* and *I sometimes find it difficult to buy fruit and vegetables for my household because of the cost.* Those who disagreed or strongly disagreed with the first statement were considered to perceive cost as a barrier, as were those who agreed or strongly agreed with the second statement. Participants were also asked *how often the cost of F&V meant that their household bought less than they would like* (*Never, Rarely, Sometimes, Often, Always, I don't buy fruit and vegetables*). Those who answered *Often* or *Always* were considered to perceive cost as