

**Urban Community Gardening.  
The impact on fruit and vegetable intake**

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# **URBAN COMMUNITY GARDENING– THE IMPACT ON FRUIT AND VEGETABLE INTAKE**

by

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**A thesis presented towards the degree of Bachelor of Science in Human  
Nutrition and Dietetics  
BSc (Hum Nut)**

at

**The University of Dublin, Trinity College**

----2011----

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## ACKNOWLEDGEMENTS

I would like to thank all of those who took part in this study. In particular I would like to thank all the garden coordinators for allowing us to visit their gardens, for giving us an insight into their gardens and for helping us to coordinate meetings with the gardeners. I would especially like to thank all the gardeners who took part in this study, who welcomed us into their gardens, allowed us to follow in their footsteps and gave up precious gardening time to fill in our questionnaire.

I would like to thank my supervisors Sheila Sugrue and Kaethe Burt O'Dea for all their guidance and contributions throughout this project. Their kindness, willingness to help and encouragement was a constant support.

I would like to thank John Kearney for his help, his patience and for taking the time to answer my questions.

I would also like to thank my family and friends for all their support and friendship over the last four and a half years.

Finally, I would especially like to thank my mam, Helen and Aidan and Derek for their constant support, understanding and encouragement without which I would not have been able to complete this course. Thank you!

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## Part A

### Literature Review

#### Urban Community Gardening – The Impact on fruit and vegetable intake

## A.1 INTRODUCTION

Urban community gardens are local projects managed for and by members of the local community. They may be run in partnership with local authorities or as part of community development or regeneration schemes (Hale et al., 2011). The gardens exist primarily in urban areas and are often established in response to a local community's lack of open green space (Viljoen et al., 2005). The scale and format of the gardens may vary. Depending on the available land and support, urban community gardening projects can be relatively small and in Dublin they range from small disused residential gardens (Cabra Park, See Figure 1) to larger sites such as the four acre site in Santry. In other countries these projects may occur on a much larger scale such as the mile and a half long 'High Line Park' elevated community garden in New York. The format of the gardens varies. They may be a collection of plots, worked individually or a communal garden. "Grow-a-row" projects in the United States and Canada actively encourage gardeners to set aside space for charitable donations (Ontario Trillium Foundation, 2011). Similarly in Dublin some of the urban community garden space is allocated to local charities such as soup kitchens (Dolphins Barn Community Garden, See Figure 1) other community groups (for example the Simon Community (Bridgefoot Street Community Garden, See Figure 1) or educational facilities for example college plots (Weaver Court Community Garden, See Figure 1) (Bellows et al., 2004)). As community-based sites, their potential for fostering environmental change irrespective of age, gender, ethnicity, income or education level has gained increased recognition (Bellows et al., 2004). Improved nutrition, increased physical activity, enhanced social engagement and improved mental health, are some of the benefits of urban community gardens that have been demonstrated to strengthen and sustain neighborhoods (Teig et al., 2009). Community gardening has a long established history worldwide with estimates of over 18,000 community gardens in the United States and Canada (McCormack et al., 2010). The concept of urban community gardening in Ireland is relatively new however as part of an ever expanding 'grow your own movement', the numbers involved are increasing. While there are no firm statistics regarding the number of urban community gardens in Dublin, current estimates are well in excess of 40 gardens (Dublin City Community Forum, 2010). Figure 1 depicts the location of the gardens and their funding bodies as determined by a recent study on the perceived contributions of community gardens to

urban life in Dublin (Moss, 2009b). The characteristics of some of the urban community gardens reviewed in this project are detailed in Appendix I.

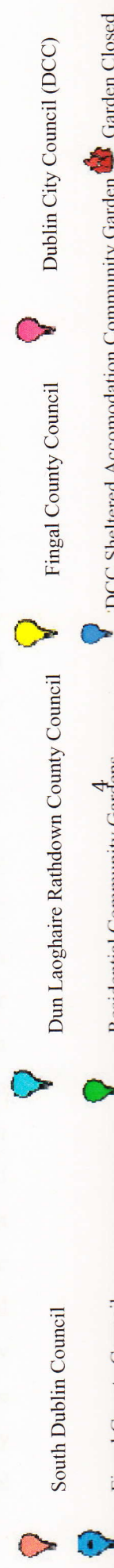
Much of the literature discusses the role of urban community gardens and school gardens as innovative tools that may facilitate increased availability and intake of fruit and vegetables. The aim of the present project is to evaluate the impact of urban community gardening in Dublin on fruit and vegetable intake.

## **A.2 URBAN COMMUNITY GARDENS IN DUBLIN**

Approximately 28% of Ireland's population live in Dublin with over a half a million people currently living in the Dublin City Area (CSO, 2011). The Central Statistics Office estimates that there will be a 16% increase in the population of Dublin by 2022 (CSO, 2011) and a 33% increase in housing allocations specifically in the Dublin city area (Regional Planning Guidelines Office, 2010). It is expected that this will result in high density property developments and urban environments that are increasingly compact (Regional Planning Guidelines Office, 2010). Such increased urbanisation in Dublin and high density planning policies mean that the provision of private gardens will reduce, more people will live in residential environments with less green space and consequently the need for access to public spaces will increase (Moss, 2009, Groenewegen et al., 2006). Such public spaces include urban community gardens. Both the Dublin Regional Planning Guidelines and the Dublin City Council Development Plans now emphasise the importance of sustainability in our communities. Nutritional health and urban community gardens have been recognized as integral components of such sustainable urban design (Deelstra and Girardet, 1999, Suarez-Herrera, 2006). Urban community gardens and allotments are highlighted as fundamental features in the development of sustainable communities in Dublin in terms of encouraging healthy lifestyles and improving quality of life (Regional Planning Guidelines Office 2010, Dublin City Council 2011).

### **A.2.1 Benefits of Urban Community Gardens**

Community gardens may convey a number of positive health benefits through increased physical activity and social capital and improved mental health, education and training.



**Figure1. Map of Community Gardens in Dublin and funding bodies (Moss, 2010)**

### **A.2.2 Physical Activity**

The Physical Activity Guidelines for Ireland highlight digging in the garden as an example of moderate aerobic activity (Department of Health and Children, 2009). Community gardens provide opportunities for physical activity with some research indicating that gardeners report physical exercise as the third most common motivation for gardening (Blair et al., 1991)

### **A.2.3 Psychological and Social well-being**

Increased urbanisation in Dublin together with a one in ten vacancy rate for dwellings in Dublin city (CSO, 2011) and a lack of community that may be experienced in urban environments, may contribute to feelings of social isolation within urban areas (Moss, 2009). Urban community gardens provide a focal point for people to come together, interact, participate and help promote a feeling of community identity (Holland, 2004, Wakefield et al., 2007). Their potential to support psychological and social well-being is well documented and in Ireland gardening is now actively incorporated into a number of mental health recovery programs (Thompson, 2011).

### **A.2.4 Education**

Much research has been devoted to garden-based nutrition education programs and their ability to improve fruit and vegetable intake in children through experiential learning. The “Delicious and Nutritious” garden study involving school children in the United States demonstrated that intake of, willingness to taste and preferences for fruit and vegetables all improved following participation in garden-based nutrition education programs (Heim et al., 2009). Such interventions have also been shown to improve the home food environment through children sharing their garden experiences at home resulting in an environment increasingly supportive of fruit and vegetable consumption (Heim et al., 2011). Support for school-garden based nutrition education is evident in Dublin, more formally through support from the ‘Organic Gardening for Primary Schools’ project (BordBia, 2008) but also through less formal activities such as school visits to local community gardens such as the Summer Row garden. Similarly, for adults, education programs have been integrated into some urban community garden projects in Dublin such as the incorporation of cookery classes into the NewCommon Court community garden. At a national level

developments such as the Food Garden Project and the Organic Centre Community Food Project support community gardens and vulnerable groups within the community. They encourage community development and through garden based programs, provide education on how to grow, cook and prepare organic healthy fruit and vegetables (SafeFood, 2011, The Organic Centre, 2011).

#### **A.2.5 Health Benefits**

Significant measurable changes associated with gardening have been identified such as changes in total and HDL cholesterol and systolic blood pressure (Caspersen et al., 1991) and reductions in rates of weight gain in children (Davis et al., 2011). Although much of the research regarding urban community gardening and its associated health benefits is anecdotal, the potential implications for health and well being are clear (Wakefield et al., 2007). A recent health impact assessment of an Irish cross-border community garden project undertaken by the Public Health Agency and the Health Service Executive demonstrates the raised profile the urban community garden and the increased awareness of its associated health benefits (Institute of Public Health, 2011). By bringing people together, generating strong local community involvement and building social capital, urban community gardens are positively associated with health and well-being (Armstrong, 2000, Hancock, 2001, Hyyppa and MaÈki, 2003). They provide opportunities for improved access to fresh food, nutrition and physical activity and in doing so provide the opportunity to shape health behaviours (Hale et al., 2011).

### **A.3 NON-COMMUNICABLE DISEASE**

Non-communicable diseases including heart disease, stroke, cancer, diabetes and respiratory disease are the leading cause of morbidity and mortality worldwide. The incidence of such chronic conditions is growing rapidly to epidemic proportions (Pomerleau et al., 2005). They currently account for 63% of all deaths worldwide with estimates of this increasing to 75% by 2020 (World Health Organisation, 2011). In Ireland cardiovascular disease and cancer account for 63% of all deaths currently (Department of Health and Children, 2010). Most chronic diseases are preventable and the rapid rates at which they are occurring may be attributed to poor overall diet quality, increased calorie intake, smoking and physical inactivity (Mozaffarian et al., 2011). Identifying modifiable risk factors with the greatest potential to reduce the risk

of chronic disease is a major public health concern (Micha et al., 2011). Targeting these modifiable risk factors and primary prevention through lifestyle and environmental interventions remains the main mechanism for reducing the burden of such chronic conditions (World Health Organisation, 2008). Suboptimal dietary habits have been identified as a major preventable cause of chronic disease (Micha et al., 2011). Specifically, low fruit and vegetable consumption has been highlighted as a modifiable risk factor for many chronic conditions (Danaei et al., 2009, Lock et al., 2005)

#### **A.4 FRUIT AND VEGETABLES**

A World Health Organisation (WHO) global burden of disease study compared the contribution of low fruit and vegetable consumption as a risk factor for disease to 25 other major risk factors (Lock et al., 2005). The findings estimate that annually 2.6 million deaths and 26.6 million disability adjusted life years worldwide may be attributable to inadequate fruit and vegetable consumption. Using population-based surveys of dietary intake data from 26 countries this study identified a minimum disease risk threshold of 600g/person per day. Food balance sheet data established that 700-800g/person of fruit and vegetables was available to populations for daily consumption. It was highlighted that even in countries with typically high fruit and vegetables intakes (Italy and Greece) the mean daily intake for each country, never exceeded 550g per day (Lock et al., 2000). It has been established that increasing fruit and vegetable intake up to this minimum of 600g per day could result worldwide in a 1.8% reduction in the global burden of chronic disease (Lock et al., 2000). In the case of ischaemic heart disease and stroke such an increase in consumption could result in a 31% and 19% reduction in disease, respectively. Similarly for stomach, oesophageal, lung and colorectal cancer reductions of 19%, 20%, 12% and 2% respectively could be achieved (Lock et al., 2005).

The protective role of fruit and vegetable intake has been documented in relation to a number of conditions such as cardiovascular disease and stroke (Ness and Powles, 1997), cancer (Danaei et al., 2005) and diabetes (Carter et al., 2010). Reductions in blood pressure, energy intake and HbA1C levels, increased satiety and the prevention of metabolic syndrome are among some of the potential health benefits (Bazzano, 2006, Feldeisen and Tucker, 2007). A number of mechanisms for the protective effect of fruit and vegetables have been suggested such as the anti-hypertensive effect

associated with flavonoids in fruits (blueberries, for example) (Sengupta and Das, 1999, Cassidy et al., 2011). However exactly how fruit and vegetables influence the mechanisms involved in chronic disease and the specific components that convey these protective effects is still uncertain (Van Duyn and Pivonka, 2000). The relationship is complex and additional factors need to be considered. Such factors include obtaining valid information on dietary intake, differences in types of fruit and vegetables, the impact of different methods of preparation and cooking, the fact that the same threshold (600g) may not apply to all protective effects, and seasonal variation both in terms of the composition of fruit and vegetables and in terms of the type and amount consumed (Lock et al., 2000, Terry et al., 2001).

Although substantial evidence exists to show that increasing fruit and vegetable intake has the potential to reverse current trends in the incidence of chronic disease (Bazzano, 2006) recent Irish research highlights suboptimal fruit and vegetable intakes in the Irish population (IUNA, 2011, Bazzano, 2006).

#### **A.4.1 Recommendations for fruit and vegetable intake**

A significant reduction in the incidence of chronic disease is associated with intakes of 600g per day of fruit and vegetables (Lock et al., 2005) however given that levels of intake are so low in some countries, 400g was established as a more appropriate or achievable minimum daily target intake (FAO/WHO, 2004, Lock et al., 2005). Consistent with this, the Irish healthy eating guidelines recommend 5 servings of fruit and vegetables per day (Department of Health and Children, 1993).

#### **A.4.2 Current dietary intake of fruit and vegetables in Ireland**

The 2007 Survey of Lifestyle Attitudes and Nutrition (SLÁN 2007) in Ireland identified that only 65% of respondents consumed at least 5 or more servings of fruit and vegetables per day with many consuming more than the recommendations, on average 7.1 daily servings (Harrington et al., 2008). More recent research however suggests that while fruit and vegetables are consumed by the majority of the Irish adult population, the average total daily intake was only 192g or 2.4 portions much lower than the recommendations (IUNA, 2011).

#### **A.4.3 Determinants of intake**

In order to promote behaviour change that facilitates increased intake, the health behaviours associated with fruit and vegetable consumption must be addressed (Kamphuis et al., 2006). While research has tended to focus on individual level factors such as attitudes, knowledge, intentions and motivation, more recently, there has been a shift to assessing the impact of the environment on health behaviours (Kamphuis et al., 2006).

#### **A.4.4 Fruit and vegetables and the environment**

It has been demonstrated that the relationship between the environment (built & physical) in terms of land use, design, behaviours and other factors have the potential to either support or compromise health (Tucs and Dempster, 2007, Larkin, 2003). Given that food is one of our most basic connections with our environment, increased emphasis is now placed on examining the relationship between food environments and health (Hale et al., 2011). A diverse range of environmental factors may determine fruit and vegetable consumption such as socioeconomic and psychosocial factors and local food availability.

Purchasing behaviour and fruit and vegetable consumption patterns vary across socioeconomic groups with household income showing a consistently positive association with fruit and vegetable intake (Giskes et al., 2002). Recently published Scientific Recommendations for Healthy Eating Guidelines in Ireland identified that the largest proportion of income in Irish households spent on healthy eating is for fruit and vegetables (FSAI, 2011). Fruit and vegetables were identified as the most expensive food groups, costing per 100 calories €0.45 compared to €0.17 for snacks, biscuits and cakes (FSAI, 2011). This indicates that the ability of those on low incomes to adhere to healthy eating guidelines and purchase nutrient dense foods such as fruit and vegetables may be compromised.

In terms of the physical environment, it has been identified as having an important influence on the consumption of healthy food with the amount of food available strongly influencing intake (Brug et al., 2006, Raynor and Wing, 2007). A recent Irish study identified that food availability (distance to and density of food outlets) plays a small but significant role in influencing the diets of individuals and communities (Layte et al., 2011). Research relating to the impact of access, availability and

affordability of fruit and vegetables on dietary intake however is conflicting. While food insecurity has been associated with significantly lower consumption of fruit and vegetables (Tingay et al., 2003) and garden access and access to home-grown produce both significantly associated with greater intakes (Billson et al., 1999, Devine et al., 1999) additional motivational, psychosocial or lifestyle factors have also been highlighted as possible predictors of fruit and vegetable intake (Dibsdall et al., 2003).

#### **A.4.5 Fruit and vegetable intake among Urban Community Gardeners**

The prevalence of low consumption of fruit and vegetables is one of the indicators used by the WHO to monitor the global status of the prevention and control of noncommunicable disease (World Health Organisation, 2008). Community based programs have been identified as a means to reduce the modifiable risk factors for noncommunicable diseases (World Health Organisation, 2008). Specifically in relation to fruit and vegetable intake, community based interventions have been demonstrated to have a positive effect on intake (Pomerleau et al., 2005). Community gardens offer important opportunities to partner with public health initiatives aimed at improving nutrition related outcomes through the development of nutritional knowledge, attitudes and dietary intake. Evidence suggests that when gardeners grow their own produce, overall food consumption patterns and dietary knowledge improves (Pothukuchi, 2004).

Currently in the scientific literature it is evident that the main focus of the benefits associated with urban community gardening has been from the perspective of community development. Research assessing the association between community garden participation and dietary intake is limited. Table 4.5 summarises studies that have been carried out in the United States to assess the impact of urban community gardening on fruit and vegetable intake. The results of these studies suggest that participation in urban community gardens is associated with greater intake of fruit and vegetables (Alaimo et al., 2008, Blair et al., 1991, Lackey, 1998, Johnson and Smith, 2006). Some studies suggest that while urban community gardeners consume similar amounts of vegetables to non gardeners, the frequency of vegetable consumption is greater (Blair et al., 1991). However in relation to fruit and other foods such as milk and sweet foods, consumption among gardeners may be less when compared to non-gardeners (Blair et al., 1991). In spite of the significant results from these studies,

questions remain over the strength of the study designs in terms of dietary assessment methods and lack of control groups (McCormack et al., 2010).

## **A.5 CONCLUSION**

This review of the literature has highlighted the numerous influences on dietary fruit and vegetable intake and the associated benefits of improved levels of intake. The World Health Organisation has identified suboptimal fruit and vegetable intake as a major risk factor for the development of chronic noncommunicable diseases. Urban community gardens also have been highlighted by the WHO as important tools in the reduction of modifiable risk factors associated with such chronic conditions. Although urban community gardening is a relatively new concept in Ireland, it is growing in popularity. Urban community gardens have long been associated with initiatives to improve psychological wellbeing and enhance local community involvement. They are now also gaining much attention as a strategy to increase both the availability and consumption of fruit and vegetables for urban residents. However the exact impact of urban community gardens on dietary intake, specifically on fruit and vegetable intake has received little attention to date. Further research is needed in this area and the present project will add to our knowledge regarding their impact in Dublin.

**Table 4.5** Summary of studies on fruit and vegetable intake among community gardeners

Author and year	Study Population	Study Design	Measures	Measurement Tools	Outcomes
Alaimo et al 2008	Gardeners: 116 Non gardeners: 650	Cross sectional random telephone FFQ.	F&V intake in households participating in community gardening compared to F&V intake in households not participating in community gardening.	8 questions from the Behavioural Risk Factor Surveillance System. Intake of: fruit juice, Other fruit, Green salad, Nonfried potatoes, Dark green leafy vegetables, Dark yellow or orange veg, Beans, Other vegetables.	Community garden participation was associated with 1.4 times more consumption of F&V than non participation. Participants were 3.5 times more likely to consume F&V at least 5 times per day.
Blair et al 1991	Gardeners: 144 Non gardeners: 67	Interviewer assisted FFQ	Nutritional, social and economic impacts.	Frequency of consumption of the following was assessed: 23 categories of vegetables, 6 categories of fruit, 6 other food categories and potential yield estimates	Gardeners consumed significantly more of 6 vegetable categories than non gardeners. Gardeners consumed less fruit, milk, sweets and sweet drinks than non-gardeners.
Lackey et al 1998	Gardeners: 123 Non gardeners: 123	Qualitative and quantitative survey	Health habits: diet, exercise and vegetable intake. Social and community activities.	Post –test, self reported intake of vegetables in the previous 24 hours and agreement/disagreement with the statement “ In the past four months, I have eaten a balanced diet most days from the Food Pyramid”	Gardeners reported consuming 11.1 vegetable servings in the previous 24 hours in comparison to control 4.5 servings and reported having had a balanced diet significantly more often than non-gardeners.
Johnson and Smith 2006	Gardeners (1 year involvement): 29 Gardeners (2 year involvement): 12	Cross sectional survey – details not specified	Not specified	Not specified	More than half of the gardeners reported they ate more F&V while they participated in the garden. Gardeners with 2-year involvement reported perceptions of having a healthier lifestyle as a consequence of gardening

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## Part B

### Research Project

#### Urban Community Gardening- the impact on fruit and vegetable intake

## ABSTRACT

**Background:** Urban community gardens are a relatively new concept in Ireland. Current estimates indicate that in excess of 40 urban community gardens exist in Dublin city. The potential for these projects to improve health and wellbeing has been well documented. Research into their impact on dietary intake, specifically fruit and vegetable intake, is limited.

**Objectives:** (1) To determine garden characteristics (2) To evaluate the impact on fruit and vegetable intake.

**Design:** A convenience sample of Dublin-based urban community gardeners was used with a convenience sample of non-gardeners used for comparative purposes.

**Setting:** The interviews for gardeners were held in gardens, in the gardeners homes and at a Dublin Community Growers meeting. For the convenience sample the interviews were held in community centres and in a city centre college.

**Subjects:** 102 subjects participated in the study. Of these 52 were involved in Dublin City Council urban community gardens and were classified as 'gardeners'. The convenience sample consisted of 50 individuals who were not involved in these projects and were classified as 'non-gardeners'.

**Methods:** A semi-quantitative questionnaire was used to assess garden produce and fruit and vegetable intake.

**Results:** Gardeners reported daily intakes of 2.8 portions of vegetables and 4.9 portions of fruit and vegetables. No difference in fruit intake was observed. Gardeners consumed significantly more vegetables (1.3 times more,  $P\text{-value}=0.030$ ) and more fruit and vegetables (1.25 times more,  $P\text{-value}=0.044$ ) than non-gardeners. Both groups consumed similar types of produce however intake at higher frequencies was observed among the gardeners only.

**Conclusion:** Participation in urban community gardening is associated with increased levels of vegetable and combined fruit and vegetable intakes and may have the potential to improve the wider home food environment.

**Keywords:** urban community gardens; urban gardens; fruit and vegetable intake.

## B.1 INTRODUCTION

A new phenomenon on the urban landscape of Dublin is that of the Urban Community Garden. Led and managed by Dublin City Council and local representatives, these projects have blossomed to the extent that there are now in excess of forty urban community gardens dotted around Dublin, both within the city centre and the suburbs (Dublin City Community Forum, 2010). On an international scale, urban community gardens have long been promoted as a valuable tool for building social capital, developing and strengthening local communities, contributing to local food security and empowering individuals to improve their overall health and well being (Bellows et al., 2004). Similarly in Dublin, the urban community garden has gained increased recognition on many levels, from its role as an integral component of sustainable communities to its supporting role in the social and psychological well-being of vulnerable groups in the community (Regional Planning Guidelines Office, 2010).

Global Burden of Disease studies, estimate that up to 2.6 million deaths per year, the equivalent of approximately 1.8% of the total burden of disease worldwide, may be directly attributable to suboptimal fruit and vegetable intake (Lock et al., 2005). An average intake of 223g/day was identified by these studies (Lock et al., 2000). Similarly recent Irish statistics highlight average fruit and vegetable intakes in Ireland at 192g/day, well below the recommendations (IUNA, 2011, Lock et al., 2000). Given these statistics and the substantial evidence for the protective role of fruit and vegetables this clearly emphasises the potential for a single dietary change (increased fruit and vegetable intake) to greatly improve public health worldwide.

Much emphasis is now placed on facilitating this dietary change and urban community gardens have been identified as possible intervention strategies for increasing fruit and vegetable intakes (FAO/WHO, 2004). Urban community gardens provide opportunities to help shape health behaviours through improved nutrition and access to fresh food (Hale et al., 2011).

Although not extensive the international literature does highlight that participation in urban community gardens may be associated with improved fruit and vegetable intake with access to fresh produce identified by the gardeners as one of the motivations for gardening (Alaimo et al., 2008, Blair et al., 1991). While support for garden based nutrition education programs in Ireland has increased and urban community garden

involvement has grown, no studies to date have been carried out in Ireland to explicitly focus on or assess the impact of urban community gardens on fruit and vegetable intake. The aim of this project is to assess the impact of urban community gardening on fruit and vegetable intake in a subgroup of gardeners in the Dublin city area relative to a group of non-gardeners in a similar geographical area.

## **B.2 METHODOLOGY**

### **B.2.1 Research method**

The following interviewer assisted semi-quantitative questionnaires were designed:

1. Dublin Urban Community Gardening Questionnaire

The questionnaire was divided into six sections (See Appendix II)

2. Dublin Urban diet and Lifestyle Questionnaire

The questionnaire was divided into five sections (See Appendix II)

A third self-administered questionnaire for the garden coordinators was developed in conjunction with community partners in an attempt to gain an insight into the history of each garden and its current status (See Appendix III).

The questionnaires were designed with several objectives in mind. The main objective of this project was to determine the fruit and vegetables cultivated by the gardeners, to assess how the produce was used and to evaluate the fruit and vegetable intake of gardeners relative to a convenience sample of non-gardeners. In addition to this, the questionnaires had a number of other objectives such as obtaining the demographics and health status of both groups, their levels of physical activity, self-perceived quality of life, and other aspects of dietary intake.

A literature review guided by the above objectives was undertaken in the development of the questionnaires. Questionnaire format included a combination of closed, open and multiple-choice questions. The frequency of fruit and vegetable intake was measured using intervals from the SLÁN 2007 food frequency questionnaire (See Appendix IV) (Harrington et al., 2008). Portion size descriptors from both the SLÁN 2007 food frequency questionnaire and the Irish Food Pyramid were used (See Appendix IV) (Department of Health, 1993, Harrington et al., 2008).

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80g which has been estimated to be equivalent to approximately one serving of fruit and vegetables was used to convert mean daily portions into mean daily intake in grams (Lock et al., 2000). The questionnaire was finalized and piloted on two members of the general public. Modifications were made to the questionnaire following the first garden visit. Both garden co-ordinators and gardeners felt unable to quantify the yield from the garden in question, and consequently any questions regarding yield were excluded. It was reported by the gardeners that they felt the questions regarding reasons for initial involvement and reasons for continued involvement in urban community gardening were repetitive and consequently the question concerning continued involvement was excluded.

### **B.2.2 Subject Selection**

To establish the gardener group, urban community garden projects in Dublin were identified from the Dublin City Guide To Community Gardening document (Dublin City Community Forum, 2010). To help achieve adequate numbers projects including both communal gardens and individual plots / allotments were included. Contact was established with eight garden coordinators by both telephone and email. From this initial contact a further four suitable projects were identified. The questionnaire was emailed to each garden coordinator for approval. The coordinators then approached individual gardeners and interest in participating in this project was determined.

Recruitment of the non-gardener group involved random selection of subjects at venues local to the urban community gardening projects – two community centres, one equine centre and one college staff canteen.

The data collection period ran over sixteen days from Saturday the 24<sup>th</sup> of September 2011 to Sunday the 9<sup>th</sup> of October 2011. Data was collected for 114 subjects (52 gardeners, 50 non-gardeners and 12 garden coordinators). Interview duration ranged from ten to fifteen minutes. For the gardener group the interviews were held either on-site in the gardens (44 subjects) in the gardener's home (3 subjects) while in attendance at garden meetings (3 subjects) or while attending a Dublin Community Growers meeting (2 subjects). Similarly for the non-gardener group the interviews were held on site at the community centres, the equine centre and in the college staff canteen.

### **B.2.3 Data Input and Coding**

All of the data from the interviewer-assisted questionnaires were coded and inputted into an SPSS software package (IBM SPSS Statistics Version 19). The data from the coordinator questionnaires were collated into one table detailing the characteristics of each garden (See Appendix I).

### **B.2.4 Statistical Analysis**

Normality of the data was determined using the Shapiro-Wilk test and by assessing the skewness and the kurtosis of the data. The data was determined as having a non-normal distribution. Non-parametric data was analysed using the Mann-Whitney test and the Spearman correlation was used to measure the strength and direction of associations within the data. Descriptive statistics (mean and standard deviation) were used to summarise and describe the main findings.

In all the tests performed, P-values of  $\leq 0.05$  were considered to be statistically significant. P-value  $\leq 0.05$ , one star (\*) statistical significance,  $\leq 0.01$  two star (\*\*) significance and  $\leq 0.001$ , three star (\*\*\*) statistical significance and  $> 0.05$ , not statistically significant.

Microsoft ® Excel 2011 and Microsoft ® Word 2011 were used to create charts and to display the results.

## B.3 RESULTS

### B.3.1 Demographics

Table 3.1a illustrates a demographic comparison of the gardener and the non-gardener groups. No significant difference between the groups was found with respect to age, gender, garden access and employment status. However differences were observed in relation to nationality. Of the gardeners interviewed 12/52 (23%) were non-Irish nationals including nationalities such as American, Canadian, Australian, English, Scottish, German, Bulgarian and Indian. This was significantly greater ( $P\text{-value} = 0.015$ ) than that for the non-gardener group of which 3/50 (6%) of the non-gardeners were non-Irish nationals. Table 3.1b illustrates a comparison of the gardener and non-gardener groups with respect to lifestyle factors; smoking habits, levels of physical activity, chronic disease status and level of community group involvement. Community group involvement was significantly greater ( $P\text{-value} = 0.020$ ) in the gardener group (24/52 46%) with respect to the non-gardener group (12/50 24%). However, with the exception of community group involvement, no other significant difference between the two groups was observed.

A comparison to the national statistics for Ireland for both smoking and physical activity levels demonstrates that this group does not differ from the general public in Ireland. National statistics in 2010 identified a 24% incidence of smoking in Ireland, while at 22% (22/102) the incidence of smoking in this group was not significantly different (Office of Tobacco Control, 2010). National statistics for physical activity levels in Ireland obtained from the National Survey of Lifestyles Attitudes and Nutrition (SLÁN 2007) show that 71% of Irish adults took part in moderate or strenuous physical activity for at least 20 minutes three or more times a week. In the present study there was no significant difference with 77.5% (79/102) of participants reporting similar levels of physical activity (Morgan K et al., 2008).

**Table 3.1a** Demographics of the Gardeners and Non-Gardeners

	<b>Total</b> (n=102)	<b>Gardener</b> (n=52)	<b>Non-Gardener</b> (n=50)	<b>P-value</b>
<b>Age (years)</b>				ns
18-29	7 (7%)	3 (6%)	4 (8%)	
30-44	33 (32%)	19 (36%)	14 (28%)	
45-64	50 (49%)	23 (44%)	27 (54%)	
65+	12 (12%)	7 (13%)	5 (10%)	
<b>Gender</b>				ns
Female	58 (57%)	26 (50%)	32 (64%)	
Male	44 (43%)	26 (50%)	18 (36%)	
<b>Nationality</b>				0.015 *
Irish	87 (85%)	40 (77%)	47 (94%)	
Other	15 (15%)	12 (23%)	3 (6%)	
<b>Access to own garden</b>				ns
Yes	69 (68%)	32 (61%)	37 (74%)	
No	33 (32%)	20 (39%)	13 (26%)	
<b>Employment Status</b>				ns
Employed	54 (53%)	25 (48%)	29 (58%)	
Self employed	10 (10%)	6 (11%)	4 (8%)	
Unemployed	15 (15%)	10 (19%)	5 (10%)	
Retired	13 (13%)	6 (11%)	7 (14%)	
Home Duties	3 (3%)	1 (2%)	2 (4%)	
State Training	3 (3%)	1 (2%)	2 (4%)	
Student	4 (4%)	3 (6%)	1 (2%)	

\* P-value ≤ 0.05, ns = not significant (P-value &gt; 0.05)

**Table 3.1b** Lifestyle factors of the Gardeners and Non-Gardeners

	<b>Total (n=102)</b>	<b>Gardener (n=52)</b>	<b>Non-Gardener (n=50)</b>	<b>P-value</b>
<b>Smoking</b>				ns
Non-smoker	80 (78%)	37 (71%)	43 (86%)	
Smoker	22 (22%)	15 (29%)	7 (14%)	
<b>Alcohol</b>				ns
Non-drinker	24 (23%)	11 (21%)	13 (26%)	
Within the guidelines	65 (83%)	32 (61%)	33 (66%)	
Exceeding the guidelines	13 (17%)	9 (17%)	4 (8%)	
<b>Physical Activity per week (minutes)</b>				ns
Less than 150	45 (44%)	23 (44%)	22 (44%)	
More than 150	57 (56%)	29 (56%)	28 (56%)	
<b>Health status (incidence of chronic medical condition)</b>				ns
No	73 (72%)	37 (71%)	36 (72%)	
Yes	29 (28%)	15 (29%)	14 (28%)	
<b>Community Group Involvement</b>				0.020 *
No	66 (65%)	28 (54%)	38 (76%)	
Yes	36 (35%)	24 (46%)	12 (24%)	

\* P-value  $\leq 0.05$ , ns = not significant (P-value  $> 0.05$ )

### **B.3.2 Fruit and Vegetable Intake Between Gardeners and Non-gardeners**

Table 3.2 details the fruit and vegetable intake among the gardeners and non-gardeners. Levels of fruit consumption between the gardener and non-gardener groups did not differ significantly since 51/52 (98%) of the gardeners and 48/50 (96%) of the non-gardeners consumed fruit. Mean fruit intake for both groups also did not differ significantly. On average gardeners consumed 2.1 portions, or the equivalent of 167g of fruit per day, with no significant difference when compared to average daily intakes of 1.8 portions or 143g of fruit among the non-gardeners.

Vegetables were consumed by 50/52 (98%) of the gardeners and 50/50 (100%) of the non-gardeners. Mean daily vegetable intakes of the gardener group at 2.8 portions or 230g were significantly greater ( $P\text{-value}=0.030$ ) than that of the non-gardener group (2.1 portions or the equivalent of 174g). Within the gardeners, daily intake of vegetables was also significantly greater than that of fruit with a mean daily vegetable intake of 2.8 portions compared to 2.1 portions of fruit ( $P\text{-value}=0.026$ ). No significant difference between fruit and vegetable intake was observed within the non-gardener group.

When analyzing the frequency of fruit intakes a total of 47/52 (90%) of the gardeners and 37/50 (74%) of the non-gardeners reported intakes of either once a day, 2 to 3, 4 to 5 or 6 plus times a day. Similarly for vegetables a total of 50/52 (96%) of the gardeners and 48/50 (96%) of the non-gardeners reported intakes of either once a day, 2 to 3, 4 to 5 or 6 plus times a day. No significant difference in the frequency of fruit intake was observed between the gardeners and non-gardeners. However with respect to vegetables, intakes at a frequency of 6 plus times a day were reported among the gardeners only with none of the non-gardeners reporting vegetable intakes at a similar frequency.

On classifying fruit and vegetables together the average amount consumed was significantly greater ( $P\text{-value}= 0.044$ ) among the gardeners indicating that although patterns of consumption may be similar, the quantities consumed among the gardener group are greater than that of the non-gardener group.

**Table 3.2** Mean daily fruit and vegetable intake among gardeners and non-gardeners

	Total (n=102)	Gardeners (n=52)	Non Gardeners (n=50)	P-value
<b>Fruit</b>				
Consumed	99 (97%)	51 (98%)	48 (96%)	0.537 <sup>ns</sup>
Mean number of portions per day	1.9	2.1	1.8	0.211 <sup>ns</sup>
Standard deviation (portions)	1.4	1.3	1.5	
Mean amount in grams per day	155	167	143	0.211 <sup>ns</sup>
<b>Vegetables</b>				
Consumed	100 (98%)	50 (98%)	50 (100%)	0.567 <sup>ns</sup>
Mean number of portions per day	2.5	2.8	2.1	0.030 <sup>*</sup>
Standard deviation (portions)	1.5	1.6	1.2	
Mean amount in grams per day	202	230	174	0.030 <sup>*</sup>
<b>Fruit and vegetables</b>				
Mean number of portions	4.4	4.9	3.9	0.044 <sup>*</sup>
Standard Deviation (portions)	2.3	2.4	2.1	
Mean amount in grams	358	397	318	0.044 <sup>*</sup>
Proportion consuming < 5 portions	47 (46%)	20 (38%)	27 (54%)	0.117 <sup>ns</sup>
Proportion consuming 5 portions	22 (22%)	11 (21%)	11 (22%)	0.918 <sup>ns</sup>
Proportion consuming >5 portions	33 (32%)	21 (40%)	12 (24%)	0.078 <sup>ns</sup>
		Mean portions of vegetables per day	Mean portions of fruit per day	P-value
Gardeners		2.8	2.1	0.026 <sup>**</sup>
Non-Gardeners		2.1	1.8	0.126 <sup>ns</sup>

\* P-value ≤ 0.05

\*\* P-value ≤ 0.01

ns = not significant, P-value > 0.05

### **B.3.3 Garden Produce**

Figure 3.3 illustrates the fruit and vegetables cultivated by the gardeners in the current project. All of the gardeners reported consuming their own produce, with none of the produce offered for sale.

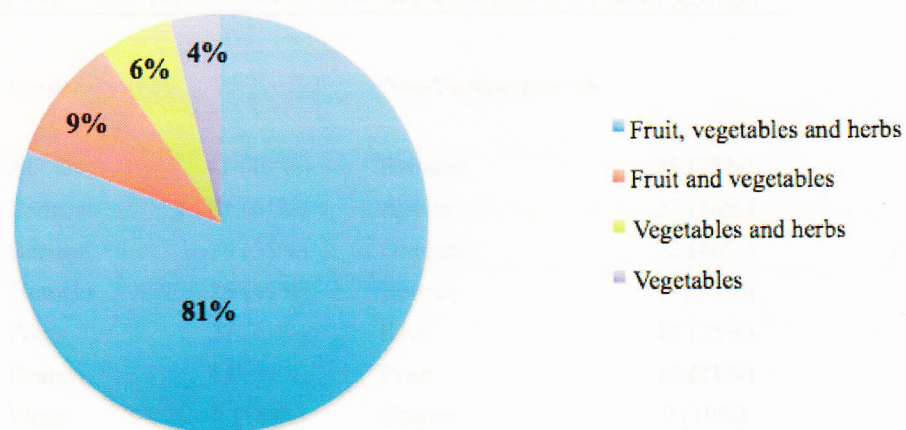
Of the 52 gardeners interviewed, 47/52 (90%) grew fruit with berries being one of the most common types of fruit produced by the gardeners. Full detail of all fruit produced in the gardens by garden type is provided in Appendix V. Vegetables were grown by 52/52 (100%) of the gardeners. All of who reported growing green leafy vegetables and salad vegetables while root vegetables and beans and peas were grown by 94.4% of gardens.

Of the gardeners interviewed 16/52 (31%) were gardening individual allotments and 36/52 (69%) of the gardeners were participating in communal gardens. Produce breakdown by garden type (allotment or communal garden) is detailed in Appendix V. The data demonstrates that a wider variety of fruit and vegetables were grown on sites involving communal gardens. For example aubergine, gerkin, cucumber, mangetout, grapes, melon, figs and kiwi are examples of fruit and vegetables that were produced by those involved in the communal gardens but not by those with individual allotments.

### **B.3.4 Types of fruit and vegetables consumed**

Commonly consumed fruit and vegetables among the gardeners and non-gardeners are detailed in Table 3.4. These do not differ significantly from the main fruit and vegetables consumed in Ireland, identified by raw data from the National Adult Nutrition Survey obtained by personal communication with Dr. Laura Keyes of the National Nutritional Survey Group. Gardeners reported consuming significantly more apples (P-value=0.008) and more pears (P-value=0.026) than those in the non-gardener group. With this exception, no other significant differences were observed in the types of fruit or vegetables consumed by both groups.

**Figure 3.3 Fruit and vegetables produced by the gardeners**



#### **Fruit and vegetables most commonly cultivated by the gardeners**

##### **Fruit (n=47)\***

Berries **	47 (100%)
Apples	35 (75%)
Rhubarb	30 (64%)
Pears	21 (45%)

##### **Vegetables (n=52)\***

Tomatoes	45 (86%)
Onions	40 (77%)
Beetroot	40 (77%)
Lettuce	37 (71%)
Leeks	37 (71%)
Spinach	35 (67%)
Cabbage	33 (63%)
Carrots	33 (63%)

\* Out of a total of 52 gardeners, 47 gardeners grew fruit and 52 gardeners grew vegetables

\*\* Berries include: Strawberries, raspberries, gooseberries, blueberries, blackcurrants, tayberries and loganberry

**Table 3.4** Fruit and vegetables commonly consumed by both groups

		Gardeners n=51	Non-Gardeners n=48	
<b>Fruit</b>				
	Apples	41 (80 %)	Bananas	35 (73%)
	Bananas	31 (61%)	Apples	27 (56%)
	Berries	28 (55%)	Oranges	22 (46%)
	Oranges	25 (49%)	Berries	19 (39%)
	Pears	21 (41%)	Kiwi	12 (25%)
	Grapes	14 (27%)	Pears	10 (21%)
	Plums	8 (16 %)	Grapes	9 (19%)
	Pineapple	8 (16%)	Plums	7 (14%)
	Other fruit	10 (20%)	Other fruit	10 (21%)
		Gardeners n=50	Non-Gardeners n=50	
<b>Vegetables</b>				
	Carrots	39 (78%)	Carrots	41 (82%)
	Onions	36 (72%)	Broccoli	32 (64%)
	Broccoli	35 (70%)	Cabbage	30 (60%)
	Tomatoes	32 (64%)	Tomatoes	30 (60%)
	Cabbage	29 (58%)	Onions	29 (58%)
	Lettuce	26 (52%)	Lettuce	28 (56%)
	Peppers	23 (46%)	Peas	24 (48%)
	Peas	19 (38%)	Peppers	21 (42%)
	Other veg	36 (72%)	Other veg	30 (60%)

Other fruit: melon, pineapple and peaches

Other veg: turnips, parsnips, spinach and cauliflower

### **B.3.5 Seasonal Impact**

In terms of seasonality and its influence over fruit intake, 65/102 (64%) of the combined group reported that their fruit intake was influenced by the time of year. Of the combined group, 47/102 (46%) reported that their vegetable intake was also influenced by seasonality. The influence of seasonality on fruit and vegetable intake reported by the gardeners and non-gardeners is detailed in Table 3.5. The influence of seasonality on fruit intake between the two groups did not differ significantly. For vegetables however while both groups reported an influence of seasonality over vegetable intake, significantly more gardeners (P-value=0.004) reported consuming vegetables in season.

**Table 3.5** Seasonal impact on fruit and vegetable intake

Question - Does the time of year affect how much fruit or vegetables you eat?

	<b>Gardener (n=52)</b>	<b>Non Gardener (n=50)</b>	<b>P-value</b>
<b>Fruit</b>			
Yes	35 (67%)	30 (60%)	0.445 <sup>ns</sup>
No	17 (33%)	20 (40%)	
Eat more fruit in summer	21 (40%)	21 (42%)	0.869 <sup>ns</sup>
Eat fruit in season	13 (25%)	7 (14%)	0.164 <sup>ns</sup>
<b>Vegetables</b>			
Yes	27 (52%)	22 (44%)	0.426 <sup>ns</sup>
No	25 (48%)	28 (56%)	
Eat more vegetables in winter	4 (8%)	8 (16%)	0.195 <sup>ns</sup>
Eat more salad in summer	9 (17%)	8 (16%)	0.860 <sup>ns</sup>
Eat vegetables in season	19 (36%)	6 (12%)	0.004 <sup>**</sup>

\* P-value  $\leq 0.05$

\*\* P-value  $\leq 0.01$

ns = not significant, P-value  $> 0.05$

### **B.3.6 Other Observations**

In addition to the main findings of this project (type of produce cultivated by the gardeners and types and amounts of fruit and vegetables consumed by both the gardeners and the non-gardeners), some additional associations were observed.

### **Fruit and vegetable intake and physical activity**

For the combined group, a positive relationship was observed between fruit and vegetable intake and being physically active in a typical week. Of the combined group 85/102 (83%) reported to be physically active in a typical week and reported a mean daily intake of 4.7 portions of fruit and vegetables. Of those 50/85 (59%) reported consuming five plus portions of fruit and veg per day. A total of 17/102 (17%) reported no involvement in regular physical activity in a typical week; of these the reported mean daily intake of fruit and vegetables was 1.1 portions per day. This association persisted within both the gardener and the non-gardener groups. Within the gardener group 45/52 (86.5%) reported being physically active in a typical week. Of these 30/45 (67%) reported consuming five plus portions of fruit and vegetables per day. Within the non-gardeners, 40/50 (80%) reported being physically active in a typical week. Of these 20/40 (50%) reported consuming five plus portions of fruit and vegetables per day.

The significance of this relationship was greater among the gardeners (P-value=0.040) than the non-gardeners (P-value=0.059).

### **Fruit and Vegetable intake and gender**

Within the gardener group significantly greater fruit intake was observed among female gardeners relative to male gardeners (P-value=0.039). This was not observed among the non-gardeners. The female gardeners reported mean daily intakes of 2.4 portions of fruit, 3.1 portions of vegetables and 5.5 portions of fruit and vegetables. Mean daily intakes of 1.7 portions of fruit, 2.5 portions of vegetables and 4.3 portions of fruit and vegetables was reported among the male gardeners. With respect to vegetables and fruit and vegetables, no significant difference was observed between females and males.

### **Fruit and vegetable intake and long-term medical conditions**

Within the gardener group a significant inverse relationship was observed between the daily portions of vegetables consumed and the presence of a long-term medical condition (P-value=0.031). Of the gardeners interviewed 15/52 (28%) reported having a long-term medical condition, where of these 11/15 (73.3%) reported consuming less than 2.5 portions of vegetables per day. A similar correlation between vegetable intake and the presence of a long-term medical condition was not observed among the non-gardeners.

Figure 3.6a Correlation between fruit intake and gender

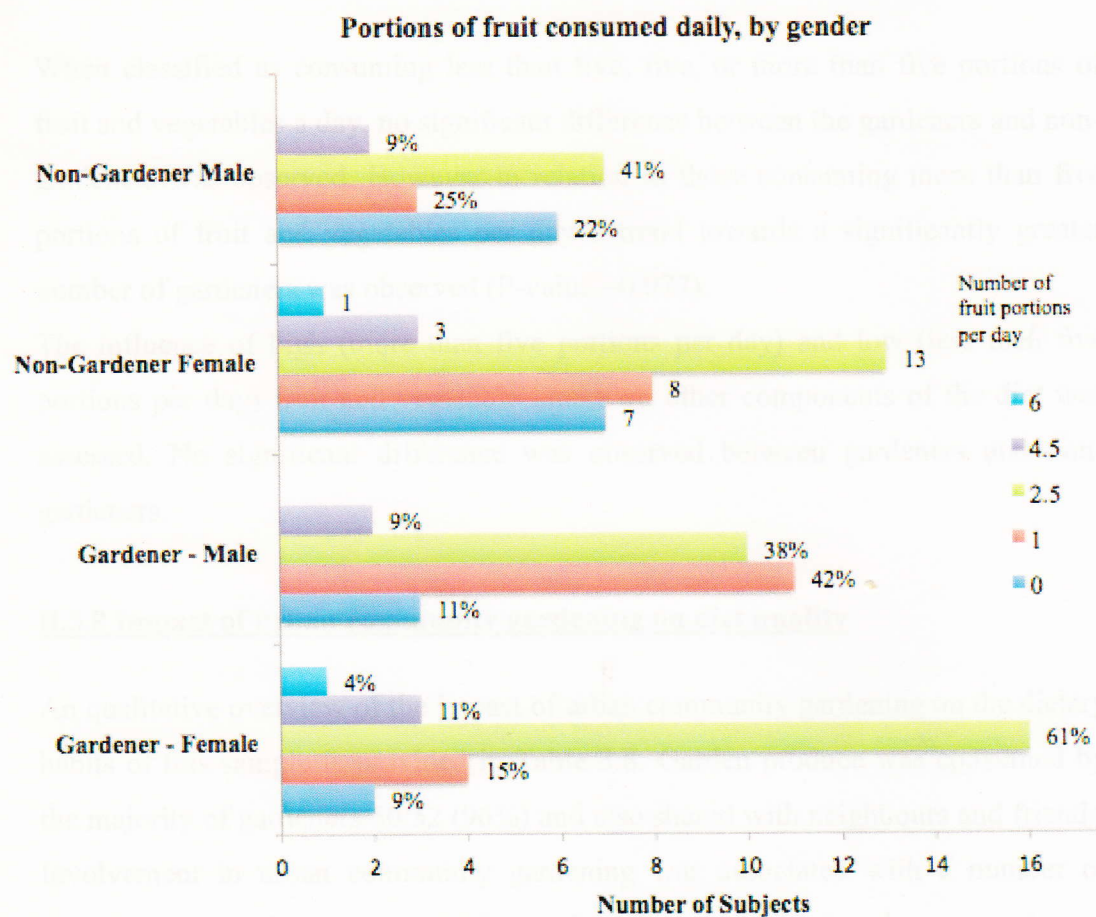
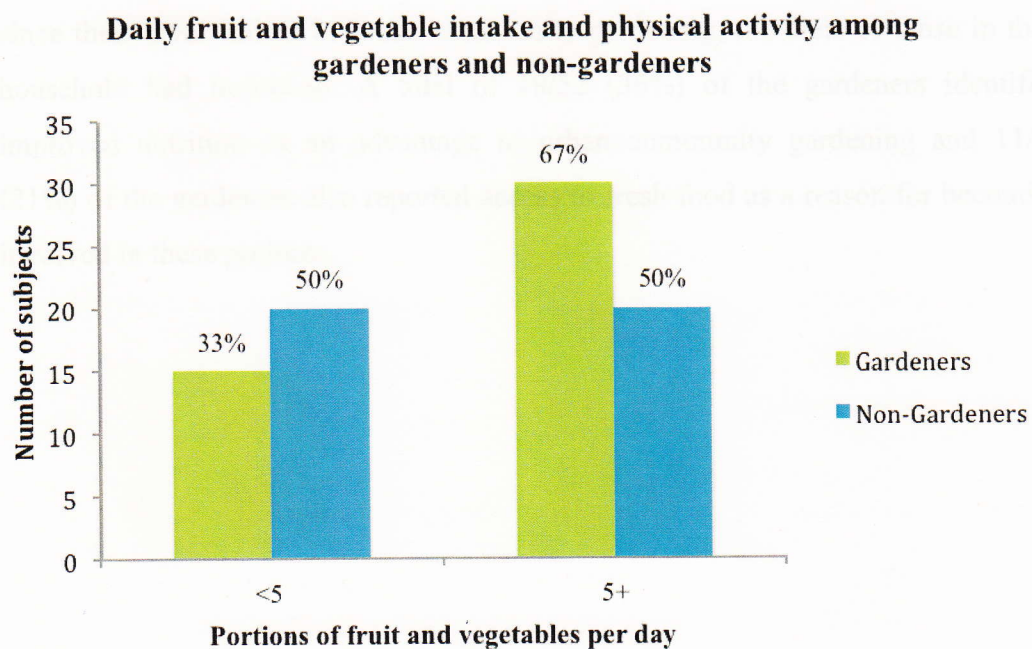


Figure 3.6b Correlation between fruit and vegetable intake and physical activity



### **B.3.7 Impact of fruit and vegetable intake on the consumption of other foods**

When classified as consuming less than five, five, or more than five portions of fruit and vegetables a day, no significant difference between the gardeners and non-gardeners was observed. However in relation to those consuming more than five portions of fruit and vegetables per day a trend towards a significantly greater number of gardeners was observed (P-value =0.077).

The influence of high (more than five portions per day) and low (less than five portions per day) fruit and vegetable intake on other components of the diet was assessed. No significant difference was observed between gardeners and non-gardeners.

### **B.3.8 Impact of urban community gardening on diet quality**

An qualitative overview of the impact of urban community gardening on the dietary habits of this sample is provided in Table 3.8. Garden produce was consumed by the majority of gardeners 50/52 (96%) and also shared with neighbours and friends. Involvement in urban community gardening was associated with a number of positive dietary changes among the gardeners such as increased consumption of fresh food 19/52 (36%) and exposure to new vegetables 21/52 (40%). A total of 49/52 (94%) of gardeners reported that the garden produce was consumed by those living within their household. A total of 31/52 (60%) of gardeners reported that since their involvement in urban community gardening, the diets of those in their household had improved. A total of 19/52 (36%) of the gardeners identified improved nutrition as an advantage to urban community gardening and 11/52 (21%) of the gardeners also reported access to fresh food as a reason for becoming involved in these projects.

**Table 3.8** Qualitative analysis of the impact of urban community gardening on diet quality

Question	Response	Proportion (n=52)
1. Do you eat what you grow in your garden?	Yes	50 (96%)
	No	2 (4%)
2. Is the produce of the garden eaten by household members?	Yes	49 (94%)
	No	3 (6%)
3. Is the produce of the garden shared with friends or neighbours?	Yes	43 (83%)
	No	9 (17%)
4. Since becoming involved in community gardening has your diet changed?	Yes	34 (65%)
	No	18 (35%)
5. How has your diet changed?	More fresh food	19 (36%)
	More vegetables	12 (23%)
	More F&V	11 (21%)
	More fruit	2 (4%)
6. Have you tried any new foods?	Yes	30 (58%)
	No	22 (42%)
7. What new foods have you tried?	Vegetables	21 (40%)
	F&V	6 (11%)
	Herbs	2 (4%)
	Fruit	1 (2%)
8. Have your preferences for fruit and vegetables changed?	Yes	28 (54%)
	No	24 (46%)
9. Has there been an impact on the diets in your household?	Yes	31 (60%)
	No	21 (40%)
10. How have the diets in your household changed?	More fresh food	20 (38%)
	More F&V	12 (23%)
	More vegetables	10 (19%)
	More awareness of F&V	5 (10%)
	More fruit	1 (2%)
11. Why did you become involved in community gardening?	Access to fresh food	11 (21%)
12. Do you feel that community gardening has any health benefits?	Yes	51 (98%)
	Improved nutrition	19 (36%)

F&V: fruit and vegetables

## **B.4 DISCUSSION**

The aim of this study was twofold. Firstly to determine the different types of fruit and vegetables produced by the gardeners and to determine how the garden produce was used. Secondly to evaluate the impact of urban community gardens on fruit and vegetable intake relative to a convenience sample of non-gardeners.

The present study found that while gardeners and non-gardeners consume similar types of fruit and vegetables, their pattern of intake in terms of frequency of intake and the amounts consumed, differ. Those involved in urban community gardening had fruit and vegetable intakes that were significantly greater than that of the non-gardeners.

### **B.4.1 Main Study Findings**

The prominent findings of this study of urban community gardening in terms of types of garden produce and the influence on fruit and vegetable intake of those participating in the gardens may be summarized as follows:

#### **Garden Produce**

The number of gardens producing fruit and vegetables and the types produced are detailed in Figure 3.3 with full details in Appendix V. Vegetables were cultivated in all gardens. With the exception of five gardeners, all of the gardeners interviewed also cultivated fruit in the gardens.

Although the numbers of allotment gardeners were far fewer than the numbers involved in communal gardens (16 of the 52 gardeners interviewed were tending their own individual plot or allotment while 36 of the gardeners interviewed were participating in communal gardens) comparisons in this study can still be made between the urban community gardeners and the allotment holders.

Appendix 5 details the fruit and vegetables produced by garden type (communal garden or individual allotment). Of the urban community gardens visited it is evident that the communal gardens produced a more diverse range of both fruit and vegetables. There may be a number of possible reasons for this including larger garden sizes and the availability of greater manpower in communal gardens relative to allotment sites.

### **Fruit and vegetable intake**

In terms of the data obtained in the present study for fruit and vegetable intake, a comparison with the national statistics for Ireland was made. Similarly a comparison of intakes between the gardeners and non-gardeners in the current study was also made.

### **Comparison with national statistics**

Results of the SLÁN 2007 survey indicate mean daily intakes for the Irish population of 2.8 (3.7) portions of fruit, 4.2 (4.1) portions of vegetables and 7.1(5.5) portions of fruit and vegetables combined (where the figures in brackets indicates the standard deviation on the mean) (Harrington et al., 2008). Findings also indicated that vegetable intakes were significantly greater than fruit intakes, and intakes of fruit and vegetables were significantly greater among females relative to males (Morgan K et al., 2008). More recent summary statistics from the National Adult Nutrition Survey, indicate estimates of mean daily fruit and vegetable intakes for the Irish population of 192g per day, the equivalent of 2.4 portions per day (IUNA, 2011). In a personal communication received from Dr. Laura Keyes of the National Nutritional Survey Group, on the 10<sup>th</sup> of November 2011, the raw data associated with this survey for the total population, estimated mean daily intakes (excluding intake from composite meals) at 91.4g (110g) for fruit and 93.9g (70.3g) for vegetables and 185g (131g) for fruit and vegetables with a standard deviation on the mean of approximately 128g or 1.6 portions (IUNA, 2011). Consistent with the SLÁN 2007 results, the data from the National Adult Nutrition Survey also indicate greater intakes of fruit and vegetables among females relative to males. In contrast to the SLÁN 2007 data, the data obtained from Dr. Laura Keyes of the National Nutritional Survey Group, on the 10<sup>th</sup> of November 2011 identified vegetable intake to be greater than fruit intake for males only. In interpreting the differences in survey estimates it is important to be aware of the different methodologies employed by each study. The National Adult Nutrition Survey collected dietary intake data using 4-day food diaries. The survey incorporated training and the use of a food atlas (IUNA b, 2011). The SLÁN 2007 survey employed a self-administered semi-quantitative food frequency questionnaire (Harrington et al., 2008).

The data from the present study for the combined group indicate average daily intakes of  $1.9 \pm 1.4$  portions of fruit,  $2.5 \pm 1.5$  portions of vegetables and  $4.4 \pm 2.3$  portions of

fruit and vegetables. These are generally less than the SLÁN 2007 averages for fruit and combined fruit and vegetable intakes, but are conversely greater than the IUNA statistics. This may possibly be explained by the differences in methodologies used to measure dietary intake in both reports.

Similar trends to those observed in SLÁN 2007 were apparent among the gardener group with vegetable intake significantly greater than that of fruit and a significantly greater intake of fruit and vegetables was evident among the female gardeners relative to the male gardeners.

### **Comparison between gardeners and non-gardeners.**

When compared with a convenience sample of non-gardeners (a peer group demographically similar to the gardeners), a statistically significant difference in fruit and vegetable intake between the gardeners and non-gardeners became evident. In relation to fruit, the existing literature associates participation in urban community gardening with lower levels of fruit intake. It also highlights consumption of different types of fruit specifically lower intake of citrus fruit among urban community gardeners (Blair et al., 1991). A similar trend was not evident in the current study. No significant difference in mean daily fruit intake was observed between gardeners and non-gardeners. Similarly no significant difference was apparent in relation to citrus fruit intakes, although greater consumption of apples and pears was noted among the gardeners. This observation however may be due to the fact that a number of gardeners reported growing apples (75% of gardeners) and pears (45% of gardeners) in their garden.

The existing literature also associates involvement in urban community gardening with higher intakes of both vegetables and fruit and vegetables, together with a greater frequency of intakes and consumption of different types of vegetables among gardeners relative to the non-gardeners (Alaimo et al., 2008, Blair et al., 1991, Lackey, 1998, Johnson and Smith, 2006). Consistent with this, the results of the current study identified greater vegetable intake of 2.8 portions per day (1.3 times more) among the gardeners relative to the non-gardeners (2.1 portions per day). In terms of fruit and vegetable intake, at 4.9 mean daily portions for the gardeners and 3.9 mean daily portions for the non-gardeners, greater fruit and vegetable intake (1.25 times more) was observed among the gardeners relative to the non-gardeners. Similarly greater frequency of vegetable intake at higher levels of intake was

observed among the gardeners relative to the non-gardeners. In contrast to the literature, and despite the significant differences in the intakes of vegetables and fruit and vegetables apparent in this study, a significant difference in the type of vegetables consumed by gardeners relative to non-gardeners was not observed in the present study.

### **Destination of the garden produce**

The garden produce was not offered for sale and as might be expected the majority of the gardeners (50/52, 96%) reported consuming the produce of their own garden. A subsequent comparison of the list of fruit and vegetables grown by the gardeners and those consumed by the gardeners (See Appendix 5) further supports this. The existing literature suggests that involvement in urban community gardens is associated with dietary changes such as greater consumption of fresh vegetables (Armstrong, 2000). This theme is also evident in the current study. Involvement in urban community gardens in the present study, was associated by the gardeners, with a number of dietary changes such as having greater preferences for fruit and vegetables, trying new foods and improved intakes of fresh foods, specifically vegetables.

### **Impact of community gardening on home food environment**

As documented in the literature, and as can be seen from the current study, garden produce is often shared by the gardeners with their neighbours, friends and family (Blair et al., 1991, Heim et al., 2009). The existing literature suggests that participation in gardening projects has the potential to influence the dietary intakes of others within the household. Consequently the home food environment may be improved in terms of the availability and consumption of fruit and vegetables (Heim et al., 2011). The gardeners in the current study identified their involvement in urban community gardens as having had a positive influence on the dietary intake of those living within their households. Table 3.8 demonstrates that 94%, the majority of the gardeners, reported that the fresh fruit and vegetables that they cultivated in their own garden was consumed by other members within their household.

### **Influence of seasonality**

Seasons are known to influence the amount and type of fruit and vegetables consumed (Lock et al., 2000). Consistent with the literature, a seasonal influence on fruit and vegetable intake was observed in the present study, among both the gardeners and the non-gardeners. A significantly greater number of gardeners reported consumption of vegetables that are in season. Although not occurring with statistical significance, it was recorded for both groups that there was less of an influence of seasonality on vegetable intake relative to fruit intake. It could be deduced that both groups had a greater tendency to consume the same amount of vegetables throughout the year the only difference being that the type of vegetables consumed by the gardeners was more likely to vary with seasonal availability.

### **Physical activity**

The existing literature suggests that those who engage in regular physical activity consume significantly more fruit and vegetables than those who are not involved in regular physical activity (Alaimo et al., 2008, Serdula et al., 1996). Consistent with the literature, the results of the present study found that those involved in regular physical activity consumed more fruit and vegetables (4.3 times more) than those who were not involved in regular physical activity. Within both the gardener and non-gardeners groups a significant positive association between the number of portions of fruit and vegetables consumed per day and reports of being physically active in a typical week was observed. This demonstrates that there may be a relationship between being physically active in a typical week and the amount of fruit and vegetables consumed.

### **Chronic disease**

Data from the sister project did not identify the gardeners as being a healthier group relative to the non-gardeners in terms of the incidence of chronic disease. The literature highlights an association between reduced incidence of chronic disease and increased fruit and vegetable intake (Lock et al., 2005). This association was not seen in the present study in the context of overall fruit and vegetable intake however for the gardeners only, the data obtained did exhibit a significant ( $P\text{-value}=0.031$ ) inverse correlation between the portions of vegetables consumed and the incidence of chronic disease.

### **Consumption of other foods in the diet**

The existing literature suggests that gardeners consume less dairy products and sweets than non-gardeners this was not observed with statistical significance in the current study for dairy intake (P-value=0.655) or for confectionery intake (P-value=0.803) (Blair et al., 1991). Similarly no positive association between higher levels of fruit and vegetable intake and overall dietary habits, such as carbohydrate, dairy, protein or confectionery intake was observed in this study.

The above findings relating to physical activity and chronic disease while observed in the present study would require a larger study with adequate numbers to explore these associations further.

### **B.4.2 Qualitative description of the gardens**

A large body of evidence exists to demonstrate the health benefits of a diet rich in fruit and vegetables. Current evidence highlights both the role of suboptimal fruit and vegetable intake in the development of chronic disease and the potential protective effect of increased levels of fruit and vegetable intake (Lock et al., 2005).

Internationally, urban community gardens are a novel but widespread aspect of urban living however in an Irish context, they are a relatively new concept. Consequently relatively little is known regarding the impact of such projects on the health and wellbeing of the urban communities in Ireland. The existing international literature on the impact of urban community gardens on fruit and vegetable intake is limited. However it is an important resource as it does highlight the potential of urban community gardens to enhance local food environments by supporting the availability of and the increased consumption of fruit and vegetables.

Over the course of this study, twelve urban community gardens out of a total of approximately forty in Dublin city were visited. They ranged greatly in size from small corner plots to larger four-acre sites and in organization from communal gardens only to sites also incorporating individual plots or allotments. Allotment sites were incorporated into five of the twelve urban community gardens. Approximately 216 gardeners are involved in these projects of which 52 were interviewed for this study. Length of involvement in the gardens ranged from less than one year (20/52, 38.5% of gardeners), one to three years (19/52, 36.5% of gardeners) and three plus years (13/52, 25%).

Throughout the site visits a number of social characteristics or qualities of both the gardens and the gardeners became clear. The gardens generally operate a closed gate policy, are locked and open at specific times mainly in the evenings and at weekends. Features common to the community gardens that were not evident in the allotment sites included the presence of a bench or a place to sit down and in those large enough, a shed with communal tools, a map of the garden and a work schedule. A number of community events are organized around the community gardens such as the outdoor cinema and school tours in the Summer Row garden, the street parties of the Sitric garden and the harvest parties common to most of the gardens.

Inclusivity is central to these projects. They transcend age, gender and ethnicity with men, women and children of all ages, nationalities and abilities actively involved in the gardens. In addition to the involvement of individual gardeners a particular focus of these projects is to involve vulnerable groups in the community. Various aspects of the gardens exemplified this such as the incorporation of an older persons group in the Cherry Orchard garden, the allocation of plots for the Simon Community in the Bridgefoot street garden, the soup kitchen plot in the Dolphins Barn garden and the Newcomen Court garden established solely for use by unemployed men. This demonstrates the social conscience with which all of the gardens have been established and run, and the general inclusivity of the projects as a whole within their respective communities.

#### **B.4.3 Study limitations**

The results obtained in the current project should be interpreted in context and with an awareness of the associated limitations.

The issues limiting the delivery of the interviews include a number of factors. Measurement of dietary intake was not the sole objective of the questionnaire. Interviews were dependent on the availability of the gardeners. The interviews were held at a time of year that may not have been optimal in terms of ease of access to those involved in the gardens. They were also held at a time of year when potentially the amount of garden produce available was limited. They were held at different locations across the city, at different times, on different days. They were carried out with limited time and most were held outdoors on-site in the gardens while the gardeners were actively participating in garden activities. The interviews were

delivered by and the data coded by two separate researches, which could potentially influence the data.

A questionnaire was employed by the current study to measure dietary intake. All methods of measuring dietary intake have inherent errors, the magnitude of which varies. Potential sources of error associated with the current questionnaires include issues with recall or memory, varying perceptions of portion sizes and interviewer error. In addition socioeconomic status which is known to influence fruit and vegetable intake, was not captured by the current questionnaire (Kamphuis et al., 2006). Similarly a degree of selection bias may have also influenced the data. It may be that those involved in urban community gardens naturally have a preference for consuming fruit and vegetables rather than the urban community gardens themselves having a positive influence on the availability and the consumption of fruit and vegetables. Issues with the quality and validity of the data need to be considered given that the data was self reported and possibly biased due to over-reporting which is known to influence self reported fruit and vegetable intakes (Hebert et al., 1995). Validation of the data could be obtained by comparison with another method such as dietary intake records (Willett, 1990 b). However given the nature and time frame of this study the use of dietary intake records would not have been a practical approach.

## **B.5 CONCLUSION**

During the course of this project twelve urban community gardens across Dublin city were visited. The different characteristics of the gardens were identified in terms of their organization and the level of community involvement. The types of fruit and vegetables cultivated by the gardeners and its use was determined. This study has also examined the effect of urban community gardening on fruit and vegetable intake within a sample of the current cohort of gardeners. A convenience sample of demographically similar individuals was used for comparison. Differences in levels of intake relative to the national statistics were observed in the study population. However, in interpreting this difference and in interpreting the reported intakes during the study, the confounding factors associated with the measurement of dietary intake data must be considered.

This study highlighted a significant positive association between fruit and vegetable intake and participation in urban community gardens. Both the gardeners and the non-

gardeners consumed similar types of fruit and vegetables. Significantly greater intake of vegetables and fruit and vegetables however was reported among the gardeners. Similarly, intake at higher frequencies was more prominent among the gardeners. The gardeners associated involvement in urban community gardening with dietary changes including improved intakes of fresh fruit and vegetables. Similarly they reported positive dietary changes among other members of their household. They attributed these changes to increased availability of fresh garden produce, a consequence of their involvement in urban community gardens.

These projects may have far-reaching effects. The present work demonstrates the ability of urban community gardens to provide opportunities for improved fruit and vegetable intake not just among the urban community gardening population but also within the wider community.

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## APPENDIX I

### Characteristics of the urban community gardens

Project/Urban Community Garden	Year Established	Community Description	Reasons for using the garden	Number of plots	Number of gardeners	Number of plants
1. Garden of the Future (Garden of the Future)	1978	Community description: A community garden located in the heart of the city, serving a diverse population.	Reasons for using the garden: To provide a space for growing vegetables and fruits, to promote community spirit, and to provide a place for social interaction.	10	20	1000
2. Garden of the Future (Garden of the Future)	1978	Community description: A community garden located in the heart of the city, serving a diverse population.	Reasons for using the garden: To provide a space for growing vegetables and fruits, to promote community spirit, and to provide a place for social interaction.	10	20	1000
3. Garden of the Future (Garden of the Future)	1978	Community description: A community garden located in the heart of the city, serving a diverse population.	Reasons for using the garden: To provide a space for growing vegetables and fruits, to promote community spirit, and to provide a place for social interaction.	10	20	1000
4. Garden of the Future (Garden of the Future)	1978	Community description: A community garden located in the heart of the city, serving a diverse population.	Reasons for using the garden: To provide a space for growing vegetables and fruits, to promote community spirit, and to provide a place for social interaction.	10	20	1000
5. Garden of the Future (Garden of the Future)	1978	Community description: A community garden located in the heart of the city, serving a diverse population.	Reasons for using the garden: To provide a space for growing vegetables and fruits, to promote community spirit, and to provide a place for social interaction.	10	20	1000
6. Garden of the Future (Garden of the Future)	1978	Community description: A community garden located in the heart of the city, serving a diverse population.	Reasons for using the garden: To provide a space for growing vegetables and fruits, to promote community spirit, and to provide a place for social interaction.	10	20	1000
7. Garden of the Future (Garden of the Future)	1978	Community description: A community garden located in the heart of the city, serving a diverse population.	Reasons for using the garden: To provide a space for growing vegetables and fruits, to promote community spirit, and to provide a place for social interaction.	10	20	1000
8. Garden of the Future (Garden of the Future)	1978	Community description: A community garden located in the heart of the city, serving a diverse population.	Reasons for using the garden: To provide a space for growing vegetables and fruits, to promote community spirit, and to provide a place for social interaction.	10	20	1000
9. Garden of the Future (Garden of the Future)	1978	Community description: A community garden located in the heart of the city, serving a diverse population.	Reasons for using the garden: To provide a space for growing vegetables and fruits, to promote community spirit, and to provide a place for social interaction.	10	20	1000
10. Garden of the Future (Garden of the Future)	1978	Community description: A community garden located in the heart of the city, serving a diverse population.	Reasons for using the garden: To provide a space for growing vegetables and fruits, to promote community spirit, and to provide a place for social interaction.	10	20	1000

Urban Community Garden	Years Established	Communal Garden / Allotment	Reasons for setting up the garden	Number of Plots	Number of Gardeners Involved	Additional Details
Robert Emmet community garden (Bridgefoot street)	3	Allotments	Community development program to engage members of the local community	54	37 individual gardeners 7 groups with approx. 2-7 members in each	
Stiric Compost Garden (Stoneybatter)	6	Communal Garden	To compost kitchen waste and experiment with growing a sample range of vegetables and herbs	Shared communal garden	8	Work is distributed through monthly group work and individual spontaneous moments. The produce used for street parties and divided among gardeners.
Cherryorchard	1	Communal Garden & Allotments	Part of the community development initiatives in the Cherryorchard regeneration program	Communal garden: 14 beds 1 Poly tunnel 1 Raised Bed Allotments: 40	10 adults 5 children 1 older persons group	Work in the communal garden and produce from the garden is distributed evenly. Some produce sold during fetes to raise money for garden
Dolphins Barn (South Circular Road)	4	Communal Garden	To bring local community together, to forge better communication and revise antisocial behavior in area. Increase awareness about the environment and to look after it.	Shared communal garden	5-6	The work is distributed among gardeners depending on their experience and horticultural knowledge. The produce is distributed among gardeners and a local soup kitchen.
Greenhills	3	Allotments	To improve disused land.	15 allotments	20	This is a residents owned community garden – the allotments are rented annually. There is a communal community flower garden. Allotment holders own their own produce. They cannot sell their produce. In practice they use the produce themselves or donate to friends and neighbours.

Urban Community Garden	Years Established	Communal Garden / Allotment	Reasons for setting up the garden	Number of Plots	Number of Gardeners Involved	Additional Details
Serenity Community Garden (Phibsborough)	2	Communal Garden	Community and landscape improvement.	Shared communal garden	3-10	Gardeners take on work load voluntarily  Produce is used by the gardeners and local residents as and when they need it.
Santry (within the victorian walled garden in Santry Demesne)	1	Communal Garden	<p>Development of gardening and cultivation skills.</p> <p>To allow cooperative work with local groups to promote the ethos of the group.</p> <p>Development and maintenance of the walled garden, emphasizing heritage and the community garden.</p> <p>Development of a physically accessible and inclusive garden that is a vibrant and useful venue for community events and initiatives.</p> <p>To adhere where possible and practicable, to sustainable green practices including organic principles.</p>	Shared communal garden	160 members of which 30 are regular gardeners	<p>This is a structured, clearly organized community garden. There is an elected Head gardener who is responsible for drawing up planting plans and scheduling works. Two other Senior Gardeners work with the head gardener and allocate work within the garden.</p> <p>A 'To Do' list is drawn up by the head and senior gardeners on a monthly basis, posted on the website and in the garden shed – the list is updated after each gardening session.</p> <p>The produce is distributed on an informal basis all produce harvested is put on a produce table and is available to anyone in the garden.</p>

Urban Community Garden	Years Established	Communal Garden / Allotment	Reasons for setting up the garden	Number of Plots	Number of Gardeners Involved	Additional Details
De Courcey square (Glasnevin)	2	Mostly Allotments but there are some communal plots	Residents have used the square for allotments since the 1st World War.	22	22 gardeners	As plots become available they can be applied for on an annual basis. Produce from each plot is for private consumption however there are some communal herb plots.
Weaver square (The Liberties)	April 2011	Allotments & a community garden	To create and provide a green space in the Liberties for use by local residents.	28 individual allotments 1 community garden	28 allotment holders. 10 community gardeners	Times and tasks are divided up among the community gardeners. The individual allotment holders are responsible for looking after their spaces. People are very generous and share their produce from the allotment.
Summerrow (North Circular Road)	2	Communal Garden	To clean up a dump and create a growing space suitable for children to grow flowers and vegetables. To create a space suitable for holding community events such as film screenings.	Shared communal garden 1 Polytunnel	10-15	Work is carried out by whoever attends the garden and the produce can be used by those working in the garden.
Newcomen Court (North Strand)	2011	Communal Garden	To support unemployed men in the community by enabling them to participate in a purposeful activity.	Shared communal garden	15	The men volunteer to do tasks appropriate to their ability and the produce is shared equally.

## APPENDIX II

### Questionnaires

#### Dublin Urban Community Gardening Questionnaire (Gardener Questionnaire)

And

#### Dublin Urban diet and Lifestyle Questionnaire (Non-Gardener Questionnaire)

**Subject ID:**

**Personal Background**

As part of this project we would also like to get some general information about the group, if that is ok with you?

What is your nationality?

Irish ☐

Other ☐

Gender

Female ☐

Male ☐

Age

18-29 ☐

30-44 ☐

45-64 ☐

65+ ☐

Do you have access to your own garden?

Yes ☐

No ☐

Smoker ☐

Non-Smoker ☐

Alcohol

Do you take a drink?

Yes ☐

No ☐

If yes, during a typical week, how much would you drink?

What is your current situation in relation to work?

Now, we are going to ask you some questions about your garden.

What do you grow in your garden?

Fruit ☐

Vegetables ☐

Herbs ☐

Do you eat what you grow in your garden?

Yes ☐

No ☐

In general, is the food produced in your garden

Eaten at home ☐

Shared with friends / neighbours ☐

Sold to local shops/ businesses ☐

Other ☐

How is the food produced in the garden divided up?

### Personal Diet and Habits

Now we are going to take a look at your fruit and vegetable intake.

Do you like to eat fruit?

Yes ☐

No ☐

What type of fruit do you eat most of?

	Never or less than once a month	1 – 3 per month	Once a week	2-4 times per week	5-6 per week	Once a day	2-3 per day	4-5 per day	6+ per day
1 Medium Portion									

As part of your usual diet, if you think of a portion of fruit being 1 medium sized piece of fruit for example 1 apple, orange, medium sized banana or a small handful of berries or a glass of juice – On average how often would you eat a portion of fruit?

	Never or less than once a month	1 – 3 per month	Once a week	2-4 times per week	5-6 per week	Once a day	2-3 per day	4-5 per day	6+ per day
1 Medium Portion									

In terms of the fruit in your diet do you feel that that the time of year affects how much fruit you eat?

Yes ☐

No ☐

If yes, how does your intake change?

More in summer ☐

More in winter ☐

Other ☐

Now we will have a look at your vegetable intake.

Do you like to eat vegetables?

Yes ☐

No ☐

What type of vegetables do you eat most of?

As part of your usual diet, If you to think of a medium portion of vegetables as being 2 tablespoons of cooked or frozen veg or salad - On average how often would you eat a portion of vegetables?

	Never or less than once a month	1 – 3 per month	Once a week	2-4 times per week	5-6 per week	Once a day	2-3 per day	4-5 per day	6+ per day
1 Medium Portion									

In terms of the vegetables in your diet do you feel that the time of year affects how much vegetables you eat?

Yes ☐

No ☐

If yes, how does your intake change?

More in summer

More in winter

Other

Now I am going to ask you a few quick questions about some other foods in your diet?

If we look at Breads, cereals, rice, pasta and potatoes first. In terms of a portion, if you were to think of a 1 portion as 1 medium slice of bread, 1 medium potato, 1 medium bowl of cereal, 3 dessertspoons of cooked rice or pasta – in a usual day how many portions would you have?

1 ☐

2 ☐

3 ☐

4 ☐

5 ☐

6 ☐

>6 ☐

If we look at Milk, cheese, yogurts now. If you consider 1 portion as 1 medium glass of milk (200mls) or 1 medium carton of yogurt or 1 oz of of cheese – a matchbox portion of cheese – in a usual day how many portions would you have?

1 ☐

2 ☐

3 ☐

>3 ☐

If we look at Red meat, fish, poultry and eggs now. If you were to think of a portion as 2 oz of meat or 3oz of fish or 2 eggs in a usual day how many portions would you have?

<2 ☐

2 ☐

>2 ☐

Do you use butter / spreads

Yes ☐

No ☐

Butter ☐

Spreads ☐

Now if we look at sugar, jam, chocolate, biscuits, cakes, sweets, in a usual day would you eat these foods and if you think of a portion as 1 biscuit, 1 medium piece of cake, 1 small bar, how many portions would you have in a day?

1 ☐

2 ☐

3 ☐

>3 ☐

Salt  
Do you use salt?

- In cooking ☐
- At the table ☐
- In cooking and at the table ☐
- Never ☐

In a usual day would you drink fizzy drinks?

- Yes ☐
- No ☐

Do you feel that your diet is

- Very healthy ☐
- Healthy ☐
- Ok ☐
- Ok but could be better ☐
- Not very healthy ☐

Since you have become involved in community gardening

Do you feel that your diet has changed?

- Yes ☐
- No ☐

If yes, in what way has it changed?

Have you tried new foods?

- Yes ☐
- No ☐

What new foods have you tried?

Do you feel that you are more willing to try new foods?

- Yes ☐
- No ☐

Do you feel that your preferences for fruit and vegetables have changed?

Yes ☐

No ☐

Do you feel that being involved in community gardening has had an impact on other diets within your household?

Yes ☐

No ☐

If yes, how have they changed?

### **Personal Health**

Now we are going to ask some questions about physical activity.

In your usual week are you physically active?

Yes ☐

No ☐

What type of exercise do you do?

How many days of the week do you exercise?

1-2 ☐

2-3 ☐

3-4 ☐

4-5 ☐

6+ ☐

On those days, how long do you spend exercising?

<20 mins ☐

30 mins ☐

30+ ☐

Now we are going to ask you some questions about your general health.

In general would you say your health is..

Excellent ☐

Very Good ☐

Good ☐

Fair ☐

Poor ☐

Do you feel community gardening has any health benefits?

Yes ☐

No ☐

If yes, what are the health benefits?

Better access to food ☐

Improved nutrition ☐

Inc. Physical activity ☐

Improved mental health ☐

How would you rate your quality of life?

Very Poor ☐

Poor ☐

Neither good nor poor ☐

Good ☐

Very Good ☐

Excellent ☐

Have you any long-term medical condition?

Yes ☐

No ☐

If yes, what is the condition?

## Community Involvement

Now we are going to ask you some questions in relation to your involvement in the community.

Are you involved in any other community groups?

Yes ☐

No ☐

If yes, what group are you involved with?

Do you know many people in your community?

Yes ☐

No ☐

Do you feel that it is easy to get help in your neighbourhood if needed?

Yes ☐

No ☐

Do you feel your area is a suitable place to live?

Yes ☐

No ☐

Do you feel safe in your area?

Yes ☐

No ☐

Has your neighborhood improved in the last 2-3 years?

Yes ☐

No ☐

Is there enough public green space in your area?

Yes ☐

No ☐

### Additional Garden Information

How long have you been involved in community gardening?

< 1 year ☐

1-3 years ☐

3+ ☐

Other ☐

How did you get involved in community gardening?

Why did you get involved?

Why do you continue to be involved in community gardening?

Do you feel there are any benefits to gardening?

Yes ☐

No ☐

If yes, what are the benefits?

In your opinion could more be done to develop community gardening in Dublin?

Yes ☐

No ☐

If so what do you feel could be done?

### **Subjective Well-Being**

During the 4 weeks preceding this survey

1. Did you feel tired
  - All of time
  - Most of time
  - Some of time
  - Little of time
  - None of time
  
2. Did you feel worn out
  - All of time
  - Most of time
  - Some of time
  - Little of time
  - None of time
  
3. Did you have a lot of energy
  - All of time
  - Most of time
  - Some of time
  - Little of time
  - None of time
  
4. Have you felt full of life
  - All of time
  - Most of time
  - Some of time
  - Little of time
  - None of time
  
5. Have you felt calm and peaceful
  - All of time
  - Most of time
  - Some of time
  - Little of time
  - None of time
  
6. Have you been happy
  - All of time
  - Most of time
  - Some of time
  - Little of time
  - None of time

Subject ID:

Personal Background

As part of this project we would also like to get some general information about the group. If that is ok with you.

What is your nationality?

Irish ☐

Other ☐

Gender

Female ☐

Male ☐

Age

18-24 ☐

25-34 ☐

35-44 ☐

45+ ☐

**Dublin Urban diet and Lifestyle Questionnaire  
(Non-Gardener Questionnaire)**

Do you have access to your own garden?

Yes ☐

No ☐

Smoker ☐

Non-smoker ☐

Alcohol

On how many days?

Yes ☐

No ☐

If yes, during a typical week, how much would you drink?

**Subject ID:**

**Personal Background**

As part of this project we would also like to get some general information about the group, if that is ok with you?

What is your nationality?

Irish ☐

Other ☐

Gender

Female ☐

Male ☐

Age

18-29 ☐

30-44 ☐

45-64 ☐

65+ ☐

Do you have access to your own garden?

Yes ☐

No ☐

Smoker ☐

Non-Smoker ☐

Alcohol

Do you take a drink?

Yes ☐

No ☐

If yes, during a typical week, how much would you drink?

What is your current situation in relation to work?

### Personal Diet and Habits

Now we are going to take a look at your fruit and vegetable intake.

Do you like to eat fruit?

Yes ☐

No ☐

What type of fruit do you eat most of?

As part of your usual diet, if you think of a portion of fruit being 1 medium sized piece of fruit for example 1 apple, orange, medium sized banana or a small handful of berries or a glass of juice – On average how often would you eat a portion of fruit?

	Never or less than once a month	1 – 3 per month	Once a week	2-4 times per week	5-6 per week	Once a day	2-3 per day	4-5 per day	6+ per day
1 Medium Portion									

In terms of the fruit in your diet do you feel that that the time of year affects how much fruit you eat?

Yes ☐

No ☐

If yes, how does your intake change?

More in summer ☐

More in winter ☐

Other ☐

Now we will have a look at your vegetable intake.

Do you like to eat vegetables?

Yes ☐

No ☐

What type of vegetables do you eat most of?

As part of your usual diet, If you to think of a medium portion of vegetables as being 2 tablespoons of cooked or frozen veg or salad - On average how often would you eat a portion of vegetables?

	Never or less than once a month	1 – 3 per month	Once a week	2-4 times per week	5-6 per week	Once a day	2-3 per day	4-5 per day	6+ per day
1 Medium Portion									

In terms of the vegetables in your diet do you feel that the time of year affects how much vegetables you eat?

Yes ☐

No ☐

If yes, how does your intake change?

More in summer

More in winter

Other

Now I am going to ask you a few quick questions about some other foods in your diet?

If we look at Breads, cereals, rice, pasta and potatoes first. In terms of a portion, if you were to think of a 1 portion as 1 medium slice of bread, 1 medium potato, 1 medium bowl of cereal, 3 dessertspoons of cooked rice or pasta – in a usual day how many portions would you have?

1 ☐

2 ☐

3 ☐

4 ☐

5 ☐

6 ☐

>6 ☐

If we look at Milk, cheese, yogurts now. If you consider 1 portion as 1 medium glass of milk (200mls) or 1 medium carton of yogurt or 1 oz of of cheese – a matchbox portion of cheese – in a usual day how many portions would you have?

1 ☐

2 ☐

3 ☐

>3 ☐

If we look at Red meat, fish, poultry and eggs now. If you were to think of a portion as 2 oz of meat or 3oz of fish or 2 eggs in a usual day how many portions would you have?

<2 ☐

2 ☐

>2 ☐

Do you use butter / spreads

Yes ☐

No ☐

Butter ☐

Spreads ☐

Now if we look at sugar, jam, chocolate, biscuits, cakes, sweets, in a usual day would you eat these foods and if you think of a portion as 1 biscuit, 1 medium piece of cake, 1 small bar, how many portions would you have in a day?

1 ☐

2 ☐

3 ☐

>3 ☐

Salt

Do you use salt?

In cooking ☐

At the table ☐

In cooking and at the table ☐

Never ☐

In a usual day would you drink fizzy drinks?

Yes ☐

No ☐

Do you feel that your diet is

Very healthy ☐

Healthy ☐

Ok ☐

Ok but could be better ☐

Not very healthy ☐

### Personal Health

Now we are going to ask some questions about physical activity.

In your usual week are you physically active?

Yes ☐

No ☐

What type of exercise do you do?

How many days of the week do you exercise?

1-2 ☐

2-3 ☐

3-4 ☐

4-5 ☐

6+ ☐

On those days, how long do you spend exercising?

<20 mins ☐

30 mins ☐

30+ ☐

Now we are going to ask you some questions about your general health.

In general would you say your health is..

Excellent ☐

Very Good ☐

Good ☐

Fair ☐

Poor ☐

How would you rate your quality of life?

Very Poor ☐

Poor ☐

Neither good nor poor ☐

Good ☐

Very Good ☐

Excellent ☐

Have you any long-term medical condition?

Yes ☐

No ☐

If yes, what is the condition?

### **Community Involvement**

Now we are going to ask you some questions in relation to your involvement in the community.

Are you involved in any other community groups?

Yes ☐

No ☐

If yes, what group are you involved with?

Do you know many people in your community?

Yes ☐

No ☐

Do you feel that it is easy to get help in your neighbourhood if needed?

Yes ☐

No ☐

Do you feel your area is a suitable place to live?

Yes ☐

No ☐

Do you feel safe in your area?

Yes ☐

No ☐

Has your neighborhood improved in the last 2-3 years?

Yes ☐

No ☐

Is there enough public green space in your area?

Yes ☐

No

## Subjective Well-Being

During the 4 weeks preceding this survey

1. Did you feel tired
  - All of time
  - Most of time
  - Some of time
  - Little of time
  - None of time
  
2. Did you feel worn out
  - All of time
  - Most of time
  - Some of time
  - Little of time
  - None of time
  
3. Did you have a lot of energy
  - All of time
  - Most of time
  - Some of time
  - Little of time
  - None of time
  
4. Have you felt full of life
  - All of time
  - Most of time
  - Some of time
  - Little of time
  - None of time
  
5. Have you felt calm and peaceful
  - All of time
  - Most of time
  - Some of time
  - Little of time
  - None of time
  
6. Have you been happy
  - All of time
  - Most of time
  - Some of time
  - Little of time
  - None of time

### APPENDIX III

#### Garden Coordinator Questionnaire

Community Garden Name

Contact Number

1. When was the garden established?

2. How many people are involved in the garden?

3. How many gardens are involved in the project?

4. What is the average yield of the garden?

5. How is the work in the garden distributed?

6. How is the produce distributed?

## **Garden Coordinator Questionnaire**

Community Garden Name:

Coordinator Name:

Contact Number:

1. When was this garden established?
2. For what reason(s) was this garden set up?
3. How many gardeners are involved in the garden?
4. What is the average yield of the garden?
5. How is the work in the garden distributed?
6. How is the produce distributed?

## APPENDIX IV

### Frequency responses and portion descriptors

	1-2 times per week	3-4 times per week	5-6 times per week	7-8 times per week	9-10 times per week	11-12 times per week	13-14 times per week	15-16 times per week	17-18 times per week	19-20 times per week
Apples										
Potatoes										

#### Portion Descriptors

1 cup: 1 medium sized piece of fruit for example 1 apple, orange, 1 medium sized banana or a small handful of berries or a glass of fruit

Vegetables: 2 tablespoons of cooked or raw vegetables

Grains and Legumes: 1 medium sized potato, 1 medium sized piece of bread, 1/2 cup of cooked rice, 1/2 cup of cooked lentils, 1/2 cup of cooked beans

Dairy: 1 medium sized glass of milk (200ml) or 1 medium carton of yogurt or 1 oz of cheese

Eggs: 1 whole egg or 2 egg whites or 1/2 cup of egg substitute

### Frequency of response

	Never or less than once a month	1 – 3 per month	Once a week	2-4 times per week	5-6 per week	Once a day	2-3 per day	4-5 per day	6+ per day
1 Medium Portion									

### Portion Descriptors

Fruit: 1 medium sized piece of fruit for example 1 apple, orange, 1 medium sized banana or a small handful of berries or a glass of juice.

Vegetables: 2 tablespoons of cooked or frozen veg or salad.

Breads and Cereals: 1 medium slice of bread, 1 medium potato, 1 medium bowl of cereal, 3 dessertspoons of cooked rice or pasta.

Dairy: 1 medium glass of milk (200mls) or 1 medium carton of yogurt or 1 oz of cheese

Meat, fish, poultry and eggs: 2 oz of meat or 3oz of fish or 2 eggs

## APPENDIX V

Fruit and vegetables produced by the gardeners

And

Fruit and vegetables consumed by the gardeners and the non-gardeners

### Fruit produced in the gardens

Fruit	n=47
Strawberries	44 (93.6%)
Raspberries	41 (87.2%)
Apples	35 (74.5%)
Rhubarb	30 (63.8%)
Gooseberries	26 (55.3%)
Blackcurrants	24 (51.1%)
Pears	21 (44.7%)
Blueberries	18 (38.3%)
Melon	8 (17%)
Grapes	8 (17%)
TayBerries	10 (21.3%)
Kiwi	8 (17%)
Cherries	7 (14.9%)
Figs	6 (12.8%)
LoganBerries	5 (10.6%)

### Fruit produced by garden type

Fruit	Communal Garden n=34	Individual Plot n=13
Apples	33 (97%)	2 (15.4%)
Pears	20 (59%)	1 (7%)
Strawberries	33 (97%)	11 (85%)
TayBerries	10 (29.4%)	0
Blueberries	15 (44.1%)	3 (23.1%)
Blackcurrants	20 (59%)	4 (31%)
Gooseberries	24 (71%)	2 (15.4%)
LoganBerries	5 (14.7%)	0
Raspberries	34 (100%)	7 (53.8%)
Berries	34 (100%)	13 (100%)
Rhubarb	26 (76.5%)	4 (30.8%)
Melon	8 (23.5%)	0
Grapes	8 (23.5%)	0
Figs	6 (17.6%)	0
Cherries	6 (17.6%)	1 (7.7%)
Kiwi	8 (23.5%)	0

### Vegetables produced in the gardens

	n=52
Tomatoes	45 (86.5%)
Onions	40 (76.9%)
Beetroot	40 (76.9%)
Lettuce	37 (71.1%)
Leeks	37 (71.1%)
Spinach	35 (67.3%)
Cabbage	33 (63.4%)
Carrots	33 (63.4%)
Garlic	33 (63.4%)
Peas	32 (61.5%)
Broccoli	29 (55.7%)
Parsnips	28 (53.8%)
Chard	26 (50%)
Kale	26 (50%)
Radish	25 (48%)
Peppers	24 (46.1%)
Sprouts	23 (44.2%)
Runner Bean	23 (44.2%)
Aubergine	21 (40.3%)
Turnips	20 (38.4%)
Pumpkin	20 (38.4%)
Broadbeans	18 (34.66%)
Swede	18 (34.6%)
Marrow	17 (32.6%)
Celery	16 (30.7%)
Courgette	15 (28.8%)
Cucumber	15 (28.8%)
Cauliflower	14 (26.9%)
Scallions	14 (26.9%)
MangeTout	11 (21.1%)
GreenBeans	11 (21.1%)
ChineseCabbage	8 (15.3%)
Gerkin	8 (15.3%)
Okra	8 (15.3%)
KohlRabi	5 (9.6%)
Corn	1 (1.9%)

### Vegetables produced by garden type

	Communal Garden n=36	Individual Plot n=16
Cabbage	27 (75%)	6 (37.5%)
Carrots	30 (83.3%)	3 (19%)
Turnips	16 (44.4%)	4(25%)
Parsnips	25 (69.4%)	3 (19%)
Broccoli	23 (64%)	6 (37.5%)
Lettuce	27 (75%)	10(62.5%)
Spinach	29 (81%)	6 (37.5%)
Cauliflower	12 (33.3%)	2 (12.5%)
Sprouts	17 (47.2%)	6 (37.5%)
Chard	23 (64%)	3 (19%)
Kale	26 (72.2%)	0
ChineseCabbage	8 (22.2%)	0
Tomatoes	35 (97.2%)	10 (62.5%)
Onions	30 (83.3%)	10 (62.5%)
Garlic	29 (81%)	4(25%)
MangeTout	11 (31%)	0
Peas	24 (66.7)	8 (50%)
Celery	13 (36.1%)	3 (19%)
Marrow	17 (47.2%)	0
Leeks	32 (89%)	5 (31.3%)
Corn	0	1 (6.3%)
Peppers	20 (55.6%)	4(25%)
Beetroot	34 (94.4%)	6 (37.5%)
Raddish	24 (66.7)	1 (6.3%)
Broadbeans	18 (50%)	0
GreenBeans	9 (25%)	2 (12.5%)
Spring Onions	12 (33.3%)	2 (12.5%)
Courgette	14 (39%)	1 (6.3%)
Aubergine	21 (58.3%)	0
Gerkin	8 (22.2%)	0
KohlRabi	5 (14%)	0
Okra	8 (22.2%)	0
Cucumber	15 (42%)	0
Pumpkin	20 (55.6%)	0
RunnerBean	22 (61.1%)	1 (6.3%)
Swede	18 (50%)	0

### Most Commonly consumed fruit among gardeners and non-gardeners

#### Gardeners

Apples	41/51 (80.4%)
Bananas	31/51 (60.8%)
Berries	28/51 (54.9%)
Oranges	25/51 (49%)
Pears	21/51 (41.1%)
Grapes	14/51 (27.4%)
Plums	8/51 (15.6%)
Pineapple	8/51 (15.6%)
Kiwi	5/51 (9.8%)
Peaches	5/51 (9.8%)
Rhubarb	4/51 (7.8%)
Mango	4/51 (7.8%)
Tinned	3/51 (5.8%)
Nectarines	2/51 (3.9%)
Dried	2/51 (3.9%)

#### Non Gardeners

Bananas	35/48 (72.9%)
Apples	27/48 (56.2%)
Oranges	22/48 (45.8%)
Berries	19/48 (39.5%)
Kiwi	12/48 (25%)
Pears	10/48 (20.8%)
Grapes	9/48 (18.7%)
Plums	7/48 (14.5%)
Melon	5/48 (10.4%)
Pineapple	5/48 (10.4%)
Rhubarb	3/48 (6.2%)
Nectarines	3/48 (6.2%)
Peaches	2/48 (4.1%)
Tinned	2/48 (4.1%)
Dried	1/48 (2.0%)
Mango	1/48 (2.0%)

### Most Commonly consumed vegetables among gardeners and non-gardeners

#### Gardener

Carrots	39/50 (78%)
Onions	36/50 (72%)
Broccoli	35/50 (70%)
Tomatoes	32/50 (64%)
Cabbage	29/50 (58%)
Lettuce	26/50 (52%)
Peppers	23/50 (46%)
Peas	19/50 (38%)
Turnips	18/50 (36%)
Parsnips	18/50 (36%)
Cauliflower	18/50 (36%)
Garlic	18/50 (36%)
Spinach	15/50 (30%)
Sprouts	12/50 (24%)
Beetroot	12/50 (24%)
Cucumber	9/50 (18%)
Courgette	8/50 (16%)
Beans	7/50 (14%)
Kale	6/50 (12%)
Aubergine	6/50 (12%)
Mushrooms	6/50 (12%)
MangeTout	5/50 (10%)
Celery	5/50 (10%)
RunnerBean	4/50 (8%)
GreenBeans	4/50 (8%)
Chilli	2/50 (4%)
Chard	3/50 (6%)

#### Non Gardener

Carrots	41/50 (82%)
Broccoli	32/50 (64%)
Cabbage	30/50 (60%)
Tomatoes	30/50 (60%)
Onions	29/50 (58%)
Lettuce	28/50 (56%)
Peas	24/50 (48%)
Peppers	21/50 (42%)
Spinach	15/50 (30%)
Cauliflower	15/50 (30%)
Turnips	14/50 (28%)
Beans	14/50 (28%)
Beetroot	13/50 (26%)
Parsnips	12/50 (24%)
Garlic	11/50 (22%)
Cucumber	10/50 (20%)
Sprouts	10/50 (20%)
Celery	8/50 (16%)
RunnerBean	7/50 (14%)
Courgette	7/50 (14%)
Mushrooms	8/50 (16%)
MangeTout	6/50 (12%)
GreenBeans	6/50 (12%)
Aubergine	6/50 (12%)
Kale	5/50 (10%)
Chard	4/50 (8%)