

# Reasons why vegetable cultivation increases or does not increase vegetable intake among adult vegetable growers living in a city in Gunma Prefecture, Japan: a qualitative study

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## Abstract

**Objective:** We examined the reasons why vegetable cultivation increases or does not increase vegetable intake among adult Japanese vegetable growers.

**Materials and Methods:** A qualitative cross-sectional study using a self-completed anonymous questionnaire was sent to participants (aged 20–74 years residing in three areas of a city in Gunma Prefecture, Japan) in September 2016. The questionnaire addressed perceptions of whether vegetable cultivation would increase vegetable intake, with four possible answers: strongly disagree, disagree, agree, and strongly agree. Respondents were then asked reasons for their view, with free-text responses. We also asked about participants' characteristics and whether they found that growing vegetables had changed their vegetable intake and access to vegetables. We categorized the free-text answers by content.

**Results:** We analyzed 442 answers, and reasons for vegetable growing increasing vegetable intake were grouped into five categories: “availability,” “purpose of cultivation,” “quality,” “increased positive emotions toward vegetables,” and “unconsciousness”; for it not increasing intake were also grouped into five categories: “limited quantities,” “negative emotions toward vegetables,” “cultivation for a purpose other than eating vegetables,” “access to vegetables from other sources,” and “limits associated with self-cultivation.”

**Conclusion:** We found five main reasons why vegetable growing may and may not increase vegetable intake.

**Keywords:** vegetable intake, vegetable cultivation, qualitative study, Japanese, adults

## Introduction

In recent years, a positive relationship has frequently been reported between vegetable intake and vegetable growing among adults<sup>1–16</sup>). In previous studies, positive influence of having a vegetable garden<sup>1</sup>), home-grown vegetable intake<sup>2–4</sup>), gardening or cultivation<sup>5–9</sup>), and participation in community gardening<sup>10–16</sup>) on vegetable intake has been indicated. Increased vegetable intake reduces the risk of certain chronic diseases and overall mortality<sup>17, 18</sup>). It is therefore expected that increasing vegetable intake by promoting the growing of vegetables will have a positive impact on health.

However, studies addressing the reasons why vegetable cultivation increases vegetable intake among adults remains scarce. Indeed, there may be scenarios where vegetable intake is not increased by vegetable cultivation, e.g., in circumstances where only a few vegetables are grown, or if they are grown with the intention of being sold. It is therefore necessary to clarify the reasons for vegetable intake increasing (or not) as a result of vegetable cultivation. This study addresses the question from a qualitative perspective.

## Materials and Methods

### *Study participants and methods*

We conducted a qualitative study using responses to an open-ended question in a self-administered questionnaire, drawing on data collected in previous studies<sup>19</sup>). Participants were residents aged 20–74 years from three areas of a city in Gunma Prefecture, Japan. We identified three geographic regions of the city: rural, suburban, and urban. The questionnaire was sent to a total of 2,260 households, reaching about 3,000 residents aged 20–74 years, according to the most recent Japanese national census<sup>20</sup>).

We collected survey data for September and October 2016, with two sets of questionnaires sent to all households in the three areas on September 12. We explained that (1) there was no need to reply if there were no residents aged 20–74 years in the household; (2) if there were three or more residents aged 20–74 years in the household, then two residents should reply; and (3) the survey was anonymous, and submitting a response would constitute consent to participate.

This study was approved by the Gunma University Ethical Review Board for Medical Research Involving Human Subjects (Submission No.160074, approved August 16, 2016).

### *Survey tool*

The questionnaire aimed to establish why vegetable cultivation increased or did not increase vegetable intake. First, participants were asked: “Do you think vegetable intake will be increased by growing vegetables?” A choice of four possible responses was given (strongly disagree, disagree, agree, and strongly agree). Participants were then asked to respond in their own words to the question: “Why do you think this?”

The questionnaire also included items for completion only by those growing vegetables<sup>9, 19, 23</sup>). These included sex, age, cultivation style, and perceptions of changes in vegetable intake and the availability of vegetables as a result of vegetable cultivation. Participants included a number of farmers. However, a previous study has shown that 96% of farmers cultivate vegetables for home consumption<sup>9</sup>), so we deemed their inclusion appropriate.

### *Analysis*

We divided participants into two groups according to their answer to the question: “Do you think vegetable intake will be increased by growing vegetables?” (“agree or strongly agree” vs. “disagree or strongly disagree”). Responses to the above open-ended question were categorized using the Grounded Theory approach<sup>21</sup>). We segmented the answers and identified reasons why respondents thought that vegetable intake would increase, or not, as a result of growing vegetables. We then coded the segmented answers and generated abstracted categories using these codes. These steps were repeated multiple times to ensure the validity of the results. We also calculated the perceptions of changes in vegetable intake and vegetable availability as a result of vegetable cultivation. Answers from those who said that there was no time when they had not grown vegetables were excluded.

### **Results**

A total of 873 residents from 586 households responded (25.9% household response rate). Of these, 421 were excluded because they did not grow vegetables and 10 because they did not respond to the question: “Do you think vegetable intake will be increased by growing vegetables?” The study hence included responses from 442 people.

The distribution of respondents' characteristics is shown in Table 1. In total, 55 people (12%) thought that vegetable growing would not increase vegetable consumption, and 387 (88%) thought that it would. The subjective changes in vegetable intake and vegetable availability as a result of vegetable cultivation are shown in Table 2. Of the 442 participants who grew vegetables, 145 (33%) said that there had been no time when they did not grow vegetables and were hence excluded. Of the remaining 297 participants, 172 (58%) said that their vegetable intake had increased since they began growing vegetables, and 217 (73%) said that the availability of vegetables had increased.

The reasons for respondents thinking that vegetable cultivated increased vegetable intake (or not) are shown in Table 3. Reasons for this increase were placed into five categories, across 18 codes: “availability,” “purpose of cultivation,” “quality,” “increased positive emotions toward vegetables,” and “unconsciousness reasoning.” Similarly, the reasons why vegetable cultivation did not increase vegetable intake were placed into five categories, across 13 codes: “limited quantities,” “negative emotions toward vegetables,” “cultivation for a

purpose other than eating vegetables,” “access to vegetables from other sources,” and “limits associated with self-cultivation.”

**Table 1** Distribution of characteristics

	disagree*		agree*	
	(n = 55)		(n = 387)	
	n	%	n	%
<b>Area</b>				
rural	19	35	154	40
suburban	26	47	192	50
urban	10	18	41	11
<b>Sex</b>				
female	26	47	218	56
male	29	53	166	43
(no response)	0	0	3	1
<b>Age</b>				
<60	22	40	168	43
≥60	33	60	217	56
(no response)	0	0	2	1
<b>Cultivation style (multiple answers permitted)</b>				
farmer	15	27	109	28
home gardener	35	64	279	72
community gardener	2	4	1	0
other	4	7	8	2
(no response)	0	0	10	3

\*'Disagree' is those who responded "disagree" or "strongly disagree", 'agree' is those who responded "agree" or "strongly agree" to the question "Do you think vegetable intake will be increased by growing vegetables?". The total number of responses included in the analysis was 442.

**Table 2** Subjective changes in vegetable intake and vegetable availability  
as a result of growing vegetables

	n	%
How has your vegetable intake changed since starting vegetable cultivation?		
decreased	2	1
somewhat decreased	13	4
no change	105	35
somewhat increased	95	32
increased	77	26
(no response)	5	2
Do you have more access to vegetables than you did before starting to grow vegetables?		
strongly disagree	10	3
disagree	63	21
agree	118	40
strongly agree	99	33
(no response)	7	2

Number and percentage of responses excludes the 145 participants (33%) who said there was no time when they did not grow vegetables.

**Table 3** Reasons why vegetable growing increases or does not increase vegetable intake*Reasons why vegetable growing increases vegetable intake*

<b>category</b>	<b>code</b>
availability	large amounts no need to purchase immediate access large variety continuous availability ease of access
purpose of cultivation	cultivating what one wants to eat cultivating vegetables to eat
quality	safe worry-free tasty fresh
increased positive emotions towards vegetables	interest in vegetables desire to avoid waste attachment fun
unconsciousness	shifting menus to include what is grown eating vegetables without thinking about it

*Reasons why vegetable growing does not increase vegetable intake*

<b>category</b>	<b>code</b>
limited quantities	already eat enough vegetables ability to eat only small meals
negative emotions towards vegetables	preference (do not like vegetables) no sense of waste
cultivation for a purpose other than eating vegetables	cultivation for fun cultivation for sale cultivation with no intention of eating produce
access to vegetables from other sources	receive a lot of vegetables buy enough vegetables
limits associated with self-cultivation	limited kinds limited amount limited cultivation skill limited harvest period

## Discussion

This study attempted to clarify the reasons why vegetable cultivation did or did not increase vegetable intake among adults. The topic has not been widely studied; nevertheless, it is an important issue for public health. Results will help to identify more effective intervention strategies to increase vegetable intake through vegetable cultivation.

Of those who had not grown vegetables over a period of time, 58% answered that their vegetable intake had increased since they began to grow vegetables, and 73% observed that the availability of vegetables had increased. This suggests that vegetable growing improves both vegetable intake and the availability of vegetables.

“Availability” may be one of the key reasons why vegetable cultivation increases vegetable intake. “Purpose of cultivation” may be a factor linked to availability. In other words, growing vegetables with the aim of eating them increases their availability and vegetable intake therefore also increases. The category “quality” may be related to safety, whether actual or perceived. Soil contamination can be a problem in community gardens<sup>22)</sup>. However, participants seemed to feel “safe” and “worry-free” when managing the growing space themselves. The code “tasty” may be biased because of both the fact that participants equated taste with freshness and cognitive dissonance<sup>23)</sup>. The code “increased positive emotions toward vegetables” suggests that participants may have developed greater attachment toward vegetables as a result of exposure<sup>24)</sup>. As a result, they may seek to avoid waste. Knowledge about vegetables develops through cultivation. Participants may thus become more interested in vegetables and find growing them fun as their knowledge increases, which in turn may encourage them to eat more vegetables. The code “unconsciousness reasoning” suggests that vegetable cultivation may steer participants toward increasing their vegetable intake at an unconscious level<sup>10, 25)</sup>. Growing vegetables may therefore encourage increased vegetable intake without the requirement for a conscious choice on the part of the grower.

Regarding the reasons why vegetable cultivation does not increase vegetable intake, the category “limited quantities” was used to refer to the amount that people can physically eat. For example, older people may eat less because they find it harder to chew and swallow. Some may be unable to eat, even if the supply of food is unlimited. Different approaches would be required to encourage these people to increase their vegetable intake. The category “negative emotions toward vegetables” was divided into reasons related to preference and those related to an absent sense of waste. People who do not like vegetables are unlikely to increase their intake because they have grown their own produce. Encouraged or forced to do so, they would likely waste considerable amounts. However, encouraging vegetable cultivation may help those who like vegetables or who are indifferent to increases in their vegetable intake. A number of respondents felt that “cultivation for a purpose other than eating vegetables” may not result in an increased vegetable intake. However, as previously

noted, greater exposure to vegetables may have a subconscious effect on intake. It is therefore possible that those growing vegetables for other purposes may also increase their intake, possibly without being aware of it. It is hence unclear whether this category is a genuine reason for vegetable intake not increasing or simply an unfounded perception held by some of the respondents. Vegetable cultivation may have no effect among those who are already getting enough vegetables from other sources, hence the category “access to vegetables from other sources.” For example, a previous study in a rural area of Japan reported an interactive effect on vegetable intake between vegetable cultivation and participants being given vegetables<sup>8</sup>). In an area where vegetable cultivation flourished, many people grew their own vegetables; moreover, they were also given vegetables or able to purchase them from farmers' markets<sup>19</sup>). This area therefore had large numbers of people with high vegetable intakes<sup>19</sup>). Interventions to encourage vegetable cultivation may therefore be more effective in areas with little vegetable growing and where access to other sources or vegetables (e.g., supermarkets) is relatively poor. Some respondents commented on the “limits associated with self-cultivation.” It may therefore be helpful to provide guidance to improve the effectiveness of interventions encouraging people to grow vegetables. This may require cooperation with professional growers and experts.

This study had some limitations. First, the methodology was only qualitative. Quantitative studies are therefore also needed to explore the findings over a larger sample. It also cannot be said that the data was theoretically saturated, as we did not use gradual theoretical sampling. However, a strength of the study was that we were able to incorporate data from a range of people, including those with different cultivation styles and living in three types of geographic area.

## **Conclusion**

We clarified the reasons for vegetable intake increasing (or not) due to vegetable growing. As a result, there were five main reasons why vegetable growing both may and may not increase vegetable intake. In the future, quantitative studies are needed to explore the findings.

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## **Conflict of Interest**

The authors have no conflict of interest to report.



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