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## **Participation in mushroom picking in Finland**

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## **Abstract**

The majority of the Finnish adult population, 73 percent, reported having the skills to pick mushrooms. About 38% of the Finns reported picking mushrooms annually in the years 1998-2000. The popularity of mushroom picking is related to everyman's right, the right to open access to private forests, which also includes the opportunity to pick mushrooms. This study searches for the factors that explain who has mushroom picking skills. It also focuses on participation and the frequency of participation in mushroom picking among Finnish people. The data of this study are based on a population survey collected in the years 1998-2000 among Finnish population aged 15–74.

The results show that being female gender or older person, living in eastern or southern Finland, having access to a vacation home and participating in a number of outdoor activities were factors that explained the presence of mushroom picking skills. The results of a logistic regression model and negative binomial regression models also show that participation and the frequency of participation are related to being female or an older person, living in eastern and southern Finland, having a rural place of residence as well as the abundance of the mushroom crop during picking season.

**Keywords:** mushroom picking, outdoor recreation, forest recreation, participation, population survey

## Introduction

During the autumn months mushroom picking is a popular outdoor activity in Finland. In earlier times, wild mushrooms were an important part of the Finnish diet, particularly in the eastern parts of the country (Sarmela, 1994). In the 1970's and 80's, 70% of Finnish households still picked mushrooms for their own use, and almost all (96%) told that they are able to recognise at least some mushroom species (Pekkarinen et al., 1980). Today, four out of five Finns report using wild mushrooms as a part of their diet sometimes, and two out of five report picking wild mushrooms themselves (Feodoroff, 1999; Pouta and Sievänen, 2001). However, mushroom picking is still more popular among people living in eastern Finland than in western Finland (Sievänen et al., 2002). Interestingly, the mushroom species used in eastern and western Finland differ rather remarkably. People pick *Lactarius* species in the east, and *Cantharellus* and *Boletus* species in the west (Pekkarinen et al., 1980).

Mushroom picking is an activity that demands the ability to wander in forested areas without getting lost. It requires a good knowledge of the forest ecosystem and its seasonal changes in order to learn to be aware where and when the mushrooms are growing. That knowledge is difficult to come by if one lives in a neighbourhood far away from the forest and opportunities to visit forested areas are few and occasional. In particular, the picker must be able to distinguish the edible mushroom species from the poisonous ones. Mushroom picking skills include the methods of cleaning and cooking them for food. The mushroom crops vary from year to year to a great extent. There can be

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years when finding any kind of mushrooms for picking is difficult. Another year, there can be abundant crops of all kinds of mushrooms available for pickers.

Typically, Finnish people pick mushrooms in timber production forests close to their home. The average distance to a mushroom picking site is 4.3 km (mean, median only 1.0 km) for the whole population (Pouta and Sievänen, 2001). Many urban people use the forests surrounding their summer cottage for mushroom picking. According to Scandinavian everyman's rights everyone is allowed access to land and is able to pick mushrooms and berries for recreational purposes in all forested and other undeveloped areas regardless of the ownership of the land. Easy access and an abundant supply of resources is a prerequisite factor for a large portion of a population being involved in picking forest food products such as wild mushrooms.

Mushroom picking is a part of Finnish culture and is also a traditional outdoor activity that brings people close to nature. Studying participation in mushroom picking offers useful insights for understanding people's relationship to the forest and to nature in general, as well as their reactions to timber harvesting and forest management. This applies particularly to urban people who may only have contact with a timber production forest when going to pick mushrooms and berries.

Only one study is found in international journals focussing on mushroom picking (Richards and Creasy, 1996). In Finland, factors affecting mushroom picking participation have only been studied separately, without forming a general picture of the socio-economic

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background and of the outdoor recreational patterns of mushroom pickers (Liikkanen et al., 1993; Pouta and Sievänen 2001). Furthermore, in addition to participation, it is also important to focus on the frequency of mushroom picking trips and on picking skills.

In this article we focus on three dimensions of mushroom picking: mushroom picking skills, participation in mushroom picking and the frequency of picking occasions, analysing which factors characterise those dimensions.

### **Research on wild food gathering**

Outdoor recreational activities have traditionally been divided into non-consumptive and consumptive activities (e.g. Li et al., 2003). Hunting, fishing and the gathering of wild foods are typically classified as consumptive activities. Research on the variables explaining participation in consumptive activities has mainly focused on hunting (e.g. Li et al., 2003; Stedman and Heberlein, 2001). The participation in consumptive activities has been described as decreasing or stable in relation to a rural way of life (Stedman and Heberlein, 2001; Mattsson and Li, 1993), as opposed to non-consumptive activities, which have grown in popularity and seem to be equally popular among urban and rural populations (Cordell et al., 1999).

Mushroom picking has been a popular consumptive activity in Nordic countries. In Finland, 38% of the population participate in mushroom picking, 55% participates in berry picking, 46% in fishing, and 7% in hunting (Pouta and Sievänen, 2001). In a Swedish

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study, it was found that the proportion of people participating in mushroom picking was stable between 1977 and 1997. However, a general notion of Swedish people was that the recreational patterns reflecting the relationship between people and nature are changing from harvesting towards the purely recreational, e.g. from consumptive toward non-consumptive recreational uses of nature (Hörnsten, 2000). In Denmark, the participation rate in mushroom picking is still relatively low - less than 3 % ( Jensen, 1999)

In many western societies, people have lost interest in consumptive recreational activities (Cordell, 1999). This decrease in participation may be caused by the difficulties that urbanised people face in accessing forests for picking wild foods. In Northern America, in many cases, land use rights prohibit access to forests close to one's home. Public lands open for recreational purposes may not be close to home, which can add extra travelling costs. However, in certain parts of the USA mushroom picking has become such a popular recreational activity that ecologists are worried about the sustainability of the forest ecosystem because of possible harm caused by intensive mushroom picking (The Economist, 1995). In some areas, the recreational and commercial picking competes with traditional Native Americans who pick wild mushrooms for subsistence (Richards and Creasy, 1996). In southern Europe, mushroom picking in Italy is a very popular activity, ten percent of all recreational forest visits relate to mushroom picking (Scrinzi et al 1995).

Mushroom picking is an outdoor activity of varying popularity in different groups of the population in Finland (Pouta and Sievänen, 2001). In previous studies in Finland, mushroom picking has been found to be related most strongly to middle or old age and

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residence in eastern regions (Liikkanen et al., 1993; Pouta and Sievänen, 2001; Feodoroff, 1999). Outdoor recreation statistics of the year 2000 (Pouta and Sievänen, 2001) report that the highest share of mushroom pickers are found in the age group of 45-64 (50%), the families of older couples (58%), those with a university education (50%), and those who live in eastern Finland (50%). The lowest participation rates were found in the age group of 15-24 (18%), students (21%), and those living in western and northern Finland (27% and 29%, respectively). In the United States, variables affecting the participation in the gathering of wild foods were geographical region, years of education and rural residence as an adult (Li et al., 2003).

In Finland, particularly in the south, summer cottage ownership is of critical importance in recreational patterns. It seems that a summer cottage is a gate to nature and to a rural way of life, especially for people living in urban areas (Sievänen and Pouta, 2003; Salo, 1984). Approximately every seventh household owns a summer cottage. The number of those who use these cottages is larger than the number of owners because summer cottages are often used by the extended family of the owner, including adult children and siblings with their families (Sievänen and Pouta, 2003; Nieminen 2004). Summer cottage ownership or the opportunity to use a cottage on a regular basis can be assumed to lower the differences in frequency and participation rates of mushroom picking between urban and rural residents.

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## **Data and methods**

### *Study population and sampling*

Our observations on mushroom picking behaviour are based on population survey data collected in the context of the Finnish national outdoor recreation demand and supply inventory (Virtanen et al., 2001). The Survey Research Unit of Statistics Finland collected data between August 1998 and May 2000. The data was collected in connection with a labour survey. A random sample of Finns aged 15-74 was drawn from the Census of Finland. The data was gathered in two phases through telephone interviews and a mail-in questionnaire. The total sample size in the first phase was 12,649 people. Interview data was gathered from 10,651 respondents (84% of those sampled). In this phase, information relating to participation in recreational activities and certain socio-economic variables was collected. The mail-in questionnaire was sent to those respondents who expressed their willingness to answer it during the telephone interview. After one reminder postcard and one follow-up form had been sent to non-respondents, two thirds (65% or 5535 persons) of the sample eventually responded to the questionnaire. Of the variables reported here, summer cottage ownership and several other background variables were measured in the mail survey. Because a two-phase survey method was used, only certain variables related to socio-economic background were covered in the total sample of 10,651 respondents. In those analyses in which we wanted to use all the background variables that were measured in the mail survey, the number of available observations declined to 5535. The mail survey was further divided into sub-samples to measure many topics and to avoid response load.

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The variable measuring the respondents' mushroom picking skills was measured from about half of the mail survey sample (2736).

### *Variables*

Participation in mushroom picking and about 85 other outdoor activities was measured in the telephone survey. In the interview, a screening question revealed whether the respondent had participated in a certain category of activity. If the respondent had done so, he or she was asked about his or her participation in individual activities in that category. After asking questions related to participation in an individual activity, for example, mushroom picking, the number of occasions per year was elicited. In the following, the participation rate means the proportion of respondents who had participated in mushroom picking during the previous 12-month period.

The variable for mushroom picking skills was measured in the mail survey by asking: a "How have you learned the skills to pick mushrooms?" The options for answers included several alternatives, e.g. that the person was taught by family, siblings, friends etc. and the alternative, "not having skills". Those respondents who selected some other option than "not having skills", were classified as having the skills needed to pick mushrooms.

The variable describing access to a summer cottage was measured in the mail survey by asking: "Do you or your family have the opportunity to use a summer cottage on

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a regular basis?" The question was formulated in such a way that ownership of the cottage was not a criterion: summer cottage access based on an existing tenancy agreement was possible as well.

The variable for the number of inhabitants in the respondents' home municipalities describes the urban-rural variation. The size classification for the municipality of each respondent was obtained from the Census of Finland. In addition, other variables related to the site of residence and the socio-economic status of the respondent was obtained from the Census.

The variable describing the yearly variety of mushroom crops is based on the date of the response to the survey. The informants who participated in the survey between August of 1998 and July of 1999 focussed their responses on the autumn of 1998 when the mushroom crop was abundant (Metla, 1998), and the other half of the informants responded on the basis of the poor mushroom crop in the autumn of 1999 (Metla, 1999).

### ***Statistical methods***

In the following analysis we used logistic regression (e.g. Hosmer and Leweshow, 2000) to explain firstly the presence of mushroom picking skills and secondly participation in mushroom picking. Logistic regression was chosen because the dependent variable was dichotomous, indicating participation and non-participation within a 12-month period

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before the survey. Significance tests for a single coefficient were based on the Wald-test. A likelihood ratio test was used to test the significance of the model. Pseudo  $R^2$  was applied as a measure of fit for the participation model. Pseudo  $R^2$  is defined as  $1 - L_m/L_0$ , where  $L_m$  is the log likelihood for the estimated model and  $L_0$  is the log likelihood for a model that includes only a constant (Hosmer and Leweshow, 2000, 166).

Thirdly, a model for participation frequencies was made by using a negative binomial regression model (Cameron and Trivedi, 1998). For mushroom picking, the frequency of participation is of the form 0, 1, 2,... times per year. A common model for analysing such count data is a Poisson regression model. Compared to the Poisson regression model the negative binomial regression model stretches the assumption of the equality of the variance and mean of the dependent variable by allowing the variance to vary from the mean. In our model, the variance differs from the mean and therefore a negative binomial model was preferred to the Poisson regression model. The model for participation frequencies was truncated from zero. A Wald test was used to test the significance of a single coefficient, and a likelihood ratio test was used to test the significance of the model. Pseudo  $R^2$  was used as a measure of model fit.

Our data have been weighted by survey-weights to improve their comparability to the Finnish population on the basis of gender, age and geographical region. For statistical analysis, weights were divided by their means so that the sum of the new weights is close

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to the real frequencies. This procedure was performed in order to avoid incorrect estimates in statistical inference.

## **Results**

### ***The variables explaining who has mushroom picking skills***

Three out of four people in the Finnish adult population were found to have mushroom picking skills. Based on our data, the variables which significantly explained who was skilled at picking mushrooms were related to gender, age, region of residence, access to a vacation home and the overall number of outdoor activities in which the person is involved. Being female or an older person, living in southern or eastern Finland, having access to a vacation home on a regular basis and participating in a high number of outdoor activities in general seemed to be the factors that increase the probability of having mushroom picking skills and belonging to the group of possible mushroom pickers.

### **TABLE 1**

### ***The variables explaining who participated in mushroom picking in last season***

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According to the data, the proportion of mushroom pickers in the entire adult population was 38% in the years 1998-2000. Of those who claimed to have the skill to participate, the participation rate was 54%. The significant factors explaining participation in mushroom picking were gender, age, place of residence (the size of the municipality and region), the quality of mushroom crops during the year previous to the survey and the number of outdoor activities in general (table 2). The abundant mushroom season increased the number of people involved in mushroom picking. The first part of the survey sample reported on the mushroom picking that took place in the fall of 1998, which was an excellent mushroom season (Metla 1998). In that part of the sample the participation rate was 44%. The rate was 33% for those who reported on the mushroom picking that took place during the poor mushroom year of 1999.

TABLE 2.

FIGURE 1.

In figure 1, the participation rates have been calculated by using the model presented in table 2. The participation rates reflect variations related to gender, region and the quality of the mushroom crop for that season. In calculating the participation rates we used the population average for age and the number of outdoor activities (according to gender), education level and the size of the municipality of residence (10000-99999 inhabitants). Figure 1 clarifies the cultural differences in mushroom picking habits between eastern and western Finland. In the most active group, females living in eastern Finland, the

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participation rate is about 60 % in a good season, which is about 20-percentage units higher than for females in western and northern Finland. The participation rate was on average 10-percentage units higher for females than for male respondents.

### *The factors effecting the frequency of picking occasions among mushroom pickers*

The negative binomial model in Table 3 demonstrates those factors that affect participation frequencies. Age, gender, the size of the municipality, and the region of residence were the socio-economic variables that significantly explained the participation frequencies of mushroom picking, but also access to a vacation home and the quality of the mushroom crop during the previous season seemed to have a significant effect on the number of mushroom picking occasions per picking season. About 50% of the mushroom pickers participated in picking five times or more during the season. Women had more occasions to pick mushroom compared to men. Moreover, the older people had more mushroom picking occasions compared to younger people. The number of people, who picked on more than 15 occasions per year, was higher in the countryside or in small towns compared to pickers living in a big city. The quality of the mushroom crops also affected the number of picking occasions to some extent. The average number of occasions for the first part of the sample, representing the year of 1998, was 7.2 for the whole population, and for the later part of the sample, which reflects the number of picking occasions in 1999, was 6.1 occasions. From these figures we can see that pickers do not compensate for poor crops with more frequent picking occasions. Instead, good crops attract mushroom

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pickers to pick more frequently than they would otherwise do. In this model we also tested the effect of income on participation frequency, but it was not significant.

### TABLE 3.

## **Conclusions and discussion**

The majority of Finnish people have mushroom picking skills, and two out of five use them annually on a year with average crop. Both participation rates and the number of picking occasions vary between years of good and poor mushroom crops. The most important socio-economic factors affecting participation in mushroom picking and the number of picking occasions, but also the presence of picking skills, are gender, age, place of residence (the size of the municipality and the location of the region). For variables related to the general outdoor recreational pattern the number of outdoor activities has an effect on participation in mushroom picking and access to a vacation home has an effect on the participation frequency.

The regional variation in mushroom picking in Finland is remarkable. The differences between regions have cultural historical roots (Sarmela, 1994), which are still seen as a cultural influence on the outdoor behaviour among the population. The first studies on mushroom picking participation rates reported statistics such as 60-90% of households in eastern Finland (Pekkarinen, 1980; Salo, 1984) and 30-60% of households in

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western or northern Finland (Pekkarinen, 1980; Salo, 1984; Saastamoinen and Lohiniva, 1989) participated in mushroom picking. Currently, participation rates in eastern Finland are 50 % compared to 28 % in western Finland (Pouta and Sievänen, 2001). This suggests that participation in mushroom picking has decreased more quickly in eastern Finland but has decreased less quickly or remained unaltered in Western Finland. In any case, the participation in mushroom picking is more popular in the east. In addition, a rural place of residence seems to be positively related to the participation as well in this study and in earlier studies. Interestingly, urban people have reported being able to identify more mushroom species than rural people (Pekkarinen, 1980). This is probably linked to the level of education, which is also positively related to the level of knowledge of mushroom species.

Picking activities seem to have remained a female dominated outdoor activity. Women are also more active in participating in berry picking (women 62%, men 49%) (Pouta and Sievänen, 2001; Pouta et al., 2004). Currently, more men take part in mushroom picking compared to previous decades. Studies from the 70's and 80's report that the differences in participation rates in picking berries and mushrooms between men and women were even larger than today. Men became more involved in picking activities during the period of urbanisation when urban families started to use the family car in order to get to good mushroom and berry picking sites (Pekkarinen, 1980; Salo, 1984).

Age and the level of education seem to have a role in mushroom picking participation. Picking activities are more common among middle-aged and older people

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than among younger people: a 50 % participation rate was found for those aged 45-64 compared to 18% among those aged 15-24. According to leisure statistics (Liikkanen et al., 1993), participation both in picking berries and mushrooms did not change for the entire population between 1981 and 1991, but it did drop among the younger groups. In this study, fewer younger people compared to older age groups have the skills for mushroom picking, which may indicate a sign of a continuing drop in mushroom picking participation in the future. The compensating effect may come from the increasing leisure time of the now active, large age group of middle aged mushroom pickers after their retirement. Furthermore, the predicted rise in the level of education in general in Finland may delay a possible decrease, since higher education is positively related to mushroom picking participation. In Sweden, mushroom picking has also been traditionally a common outdoor recreational activity, the popularity of which has remained unaltered during the last decades in a period when berry picking has decreased remarkably (Hörnsten, 2000).

Interestingly, mushroom picking frequency was not related to the income of the picker. It seems that mushrooms are not a necessity in Finnish households' food economy, but are rather luxury goods of more highly educated Finns. The same conclusion can also be drawn from the decrease in picking frequencies in years with a poor crop. This gives the impression that Finns do not have an annual mental quota or goal for the amount of mushrooms picked and conserved. Rather, they take advantage of the plentiful crops of mushrooms in those years when they appear.

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The data of this study were collected as a part of a large population survey that inventoried participation rates in 90 different outdoor activities. As the study was focussed to a wide variety of activities, detailed information such as the amount and species of picked mushroom was not available. However, because of the study context, participation in mushroom picking can be expected to be measured more correctly than it would be in a separate study. In many cases, it seems that separate studies tend to report higher participation rates than studies of a more general focus. Moreover, it is always necessary to be cautious in interpreting participation rates, which may be higher in studies than in reality ( e.g. Jensen, 2003).

The analysis of determinants of participation is helpful in order to understand the factors that may cause changes in participation and is also able to offer some tools for making predictions about the future. Analysing and understanding what is going to happen to our traditional outdoor activities in future urbanised societies and what the coming changes mean for how we can use forest resources is interesting and valuable. Shall we manage the best mushroom forests to optimise picking experiences for future generations or can we ignore picking activities and optimise use of forests even more effectively for timber production?

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Table 1. Who has learned mushroom picking skills, logistic regression model.

	Parameter estimates	p-value	Odds ratio	95% Wald confidence limits for odds ratio
<b>Constant</b>	-2.903	<0.0001		
<b>Female</b> (reference category male)	0.660	<0.0001	1.936	(1.569, 2.389)
<b>Age</b>	0.048	<0.0001	1.049	(1.041, 1.057)
<b>Region</b> (reference category western and northern Finland)				
Uusimaa province and other southern areas in Finland	0.964	<0.0001	2.623	(2.079, 3.309)
Eastern Finland	1.119	<0.0001	3.061	(2.120, 4.420)
<b>Access to a vacation home</b> (reference category no access)	0.193	0.0787	1.213	(0.978, 1.503)
<b>Number of outdoor activities</b>	0.080	<0.0001	1.083	(1.064, 1.102)
N	2221			
Mushroom picking skills (%)	73.2			
Proportion of correctly classified (%) cut point 0.50	75.3			
Log likelihood for model	-1086			
Log likelihood for constant	-1258			
Likelihood ratio test ( $\chi^2$ )	345			
df	6			
p-value	<0.0001			
Pseudo R <sup>2</sup>	0.137			

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Table 2. Participation in mushroom picking, logistic regression model.

	Parameter estimates	p-value	Odds ratio	95% Wald confidence limits for odds ratio
<b>Constant</b>	-5.049	<0.0001		
<b>Female</b> (reference category male)	0.665	<0.0001	1.944	(1.771, 2.134)
<b>Age</b>	0.050	<0.0001	1.052	(1.048, 1.055)
<b>Education level</b> (reference high)				
low	-0.214	<0.0007	0.808	(0.714, 0.914)
middle	0.009	0.8704	1.009	(0.901, 1.131)
<b>Size of municipality of residence</b> (reference category ≥ 100 000 inhabitants)				
under 10 000 inhabitants	0.228	0.0008	1.256	(1.100, 1.434)
10 000–99 999 inhabitants	0.160	0.0071	1.173	(1.044, 1.318)
<b>Region</b> (reference category western and northern Finland)				
Uusimaa province and other southern areas in Finland	0.724	<0.0001	2.063	(1.833, 2.321)
Eastern Finland	0.867	<0.0001	2.381	(2.039, 2.780)
<b>Poor mushroom season</b> (reference category productive mushroom year)	-0.697	<0.0001	2.007	(1.832, 2.200)
<b>Number of outdoor activities</b>	0.149	<0.0001	1.161	(1.151, 1.170)
N	10347			
Proportion of participants (%)	38.2			
Proportion of correctly classified (%) cut point 0.50	72.2			
Log likelihood for model	-5595			
Log likelihood for constant	-6918			
Likelihood ratio test ( $\chi^2$ )	2646			
df	10			
p-value	<0.0001			
Pseudo R <sup>2</sup>	0.191			

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Table 3. Mushroom picking participation frequency, negative binomial regression model.

	Parameter estimates	Standard error	p-value
<b>Constant</b>	0.969	0.1229	<0.0001
<b>Female</b> (reference category male)	0.144	0.0456	0.0015
<b>Age</b>	0.013	0.0016	<0.0001
<b>Uusimaa province and other southern areas in Finland</b> (reference category the rest of Finland)	0.294	0.0645	<0.0001
<b>Eastern Finland</b> (reference category the rest of Finland)	0.204	0.0786	0.0094
<b>Size of municipality of residence less than 10 000 inhabitants</b> (reference category 10 000 or more)	0.102	0.0546	0.0622
<b>Access to vacation home</b> (reference category no access)	0.110	0.0465	0.0182
<b>Poor mushroom season</b> (reference category good mushroom season)	-0.179	0.0455	0.0001
Number of observations	2250		
Log likelihood for model	-6414		
Log likelihood for constant	-10498		
Likelihood ratio test ( $\chi^2$ )	8169		
df	1		
p-value	<0.0001		
Pseudo R <sup>2</sup>	0.389		
Alpha	1.223	0.0805	<0.0001

Figure 1.

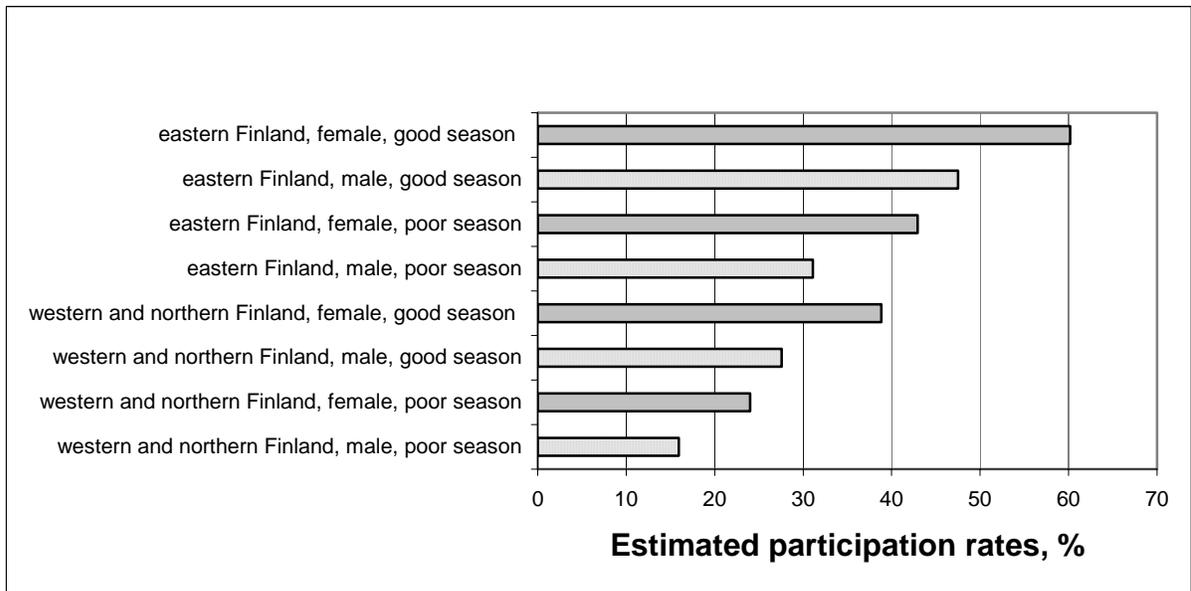


Figure 1. Examples of mushroom picking probabilities by gender, region of residence and the quality of the mushroom season.