

1 **NATURE TRIPS AND TRADITIONAL METHODS FOR FOOD PROCUREMENT IN**
2 **RELATION TO WEIGHT STATUS**

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19 **Abstract**

20 Aims

21 The purpose of this study is to assess the relationships between trips in nature, gathering of
22 wild plants, fishing and hunting and weight status.

23

24 Methods

25 Data from a cross-sectional questionnaire survey of 996 parents of 6th and 7th graders from 38
26 randomly chosen schools in two Norwegian counties. All data are self-reported: Weight and
27 height (participants were considered as overweight if BMI were 25 or higher), family trips in
28 nature (dichotomised into \geq once a week vs. less than once a week), gathering of wild
29 plants/mushrooms, fishing and hunting (all dichotomized into \geq sometimes vs. never), sex,
30 family education level and general physical activity level. Multivariate logistic regression
31 analyses were performed with overweight as the dependent variable

32

33 Results

34 Adjusting for all outdoor activities; those engaging in nature trips (OR=0.52; 95%CI=0.37-
35 0.75) and those engaging in gathering (OR=0.73; 95%CI=0.55-0.98) were less frequently
36 overweight, while those fishing (OR=1.83; 95%CI=1.35-2.47) were more frequently
37 overweight. After also adjusting for sex, family education level and general physical activity
38 level, nature trips (OR=0.52; 95%CI=0.36-0.75) and fishing (OR=1.53; 95%CI=1.12-2.10)
39 were still significant, gathering was not. No association between hunting and weight status
40 was observed.

41

42 Conclusion

- 43 Frequent family trips in nature might be an important behaviour in order to reverse the obesity
44 epidemic.
45
46 Key words: Outdoor activities, hiking, gathering, overweight, obesity
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49 **Background**

50 Cordain argues that “the model for human physical activity pattern was not established in
51 gymnasia, athletic fields, or exercise physiology laboratories, but by natural selection acting
52 over eons of evolutionary experience” (1). Until the appearance of agriculture just about
53 10 000 years ago, human ancestors were hunter-gatherers, and food procurement depended
54 directly upon energy expenditure. As such, man is evolved to engage in physical activity
55 behaviours related to hunting and gathering; such as walking in nature, gathering of wild
56 plants, hunting and fishing. However, earlier external constraints such as the availability of
57 food resources, the travel time between patches of food and the energy costs of hunting,
58 gathering and processing food have all drastically diminished in most modern environments
59 (2), and there is no longer a need to engage in these activities in order to get food. The wild
60 food gathered and hunted are also very nutrient dense (3), and wild food is indeed
61 recommended in the New Nordic Diet (4). Therefore, activities related to food procurement
62 have a double health promoting potential in increased energy expenditure and procurement of
63 healthy foods at the same time. In addition, it has also been suggested that being in a natural
64 environment may have intrinsic qualities which enhance health or well-being (5).

65

66 In Norway, the Outdoor Recreation Act established the individual's right to roam freely in the
67 wilderness throughout the year (6). The Norwegian outdoor activity tradition can be seen as a
68 further development of a natural lifestyle that has existed for a long time. In order to hunt and
69 fish in lakes a licence is needed, but gathering of wild plants and mushrooms and fishing in
70 the sea is free of charge for the public and therefore potentially accessible for all. Several
71 people are using nature for recreational purposes, and still hunting and gathering also remain
72 rather common. It has been reported that as much as 95% of the Norwegian population take

73 part in some type of outdoor activity (7). However, the gathering activities (fishing, berry-
74 picking and mushroom-picking) are on the decline (7).

75

76 The world is facing an obesity epidemic. In Norway, the HUNT study showed that the
77 prevalence of overweight men and women in the county of Nord Trøndelag increased from
78 43% to 61% among women and from 50% to 75% among men from 1984-86 to 2006-08 (8).

79 Although genetic factors may influence the susceptibility of individuals to weight gain (9),
80 there is consensus that changes in lifestyle behaviours are driving the obesity epidemic (10)
81 rather than changes in biologic or genetic factors (11). However, there is little evidence about
82 what specific foods and what types of physical activity (i.e. which specific lifestyle
83 behaviours) that contributes to the trend. Basic human behaviours, reasoned by evolutionary
84 biology, such as the physical activity in the procurement of wild food, might be part of the
85 solution of the overweight/obesity epidemic.

86

87 **Aims**

88 The purpose of this study is to assess the relationships between trips in nature, gathering of
89 wild plants, fishing and hunting and weight status among parents of middle school children.

90

91 **Methods**

92 In September 2008, a questionnaire survey was conducted among 6th and 7th graders and one
93 of their parents in 27 random schools in two Norwegian counties (Hedmark and Telemark) as
94 part of the Fruits and Vegetables Make the Marks (FVMM) project (12). The two counties are
95 rather similar, with scattered villages, no large cities and with easy access to nature for most
96 inhabitants. Research clearance was obtained from The Norwegian Social Science Data
97 Services. A total of 996 parents (of 1712 eligible, 58%) participated in the survey, and

98 constitute the study sample for the present study (see (12) for more details about the sample).
99 Of the study sample, 78% were women, 54 % had higher education, and mean age was 41.1
100 years.

101
102 Family trips in nature were assessed with the question. “How often do your family engage in
103 trips in nature (forest or mountain area)?”. The response alternatives were: Never, less than
104 once a month, less than once a week, once a week, more than once a week. This item was
105 dichotomised into \geq once a week vs. less than once a week. Gathering of wild
106 plants/mushrooms, fishing and hunting were assessed with the following statements: “I gather
107 wild plants (e.g. berries) or mushrooms”, “I go fishing”, “I go hunting”. These items had three
108 response alternatives: Yes often, Yes sometimes, No. They were all dichotomized into
109 \geq sometimes vs. never. Weight, height, sex, family education level (as a measure of socio
110 economic position, dichotomized into: one or both parents having higher education vs. none)
111 and general physical activity level (times/week doing sports or other activities being out of
112 breath or sweating) were all reported in the parent questionnaire. Participants were considered
113 as overweight if BMI were 25 or higher.

114
115 Descriptive analyses of all variables, including bivariate relationships (chi-square), are
116 presented in Table 1. Multivariate logistic regression analyses were then performed with
117 overweight as the dependent variable (Table 2). Model 1 included the four behaviours only.
118 Model 2 included sex and family education level + Model 1. Model 3 included general
119 physical activity level + Model 2. Sex, family education level and general physical activity
120 level were included in the models in order to adjust for these potential confounders of the
121 traditional outdoor activities vs. weight status relationship. Model 3 was then repeated with
122 obesity ($BMI \geq 30$) as a dependant variable. All analyses were conducted using SPSS 17.

123

124 **Results**

125 A total of 42% of the study sample (n=996) was categorised as overweight, 22% were
126 engaged in family trips in nature at least once a week, and 56%, 42% and 14% were
127 respectively at least sometimes engaged in gathering of wild plants/mushrooms, fishing and
128 hunting (Table 1).

129

130 Those engaging in family nature trips and gathering were less frequently overweight than
131 those respectively not engaging in family nature trips (32 vs. 44% overweight, p=0.002) and
132 not gathering (39 vs. 45% overweight, p=0.05), and those engaging in fishing were more
133 frequently overweight than those not fishing (48 vs. 37% overweight, p=0.001) (Table 1). No
134 significant association between hunting and weight status was observed.

135

136 Adjusting for all outdoor activities; those engaging in nature trips (OR=0.53; 95%CI=0.37-
137 0.76) and those engaging in gathering (OR=0.73; 95%CI=0.54-0.98) were less frequently
138 overweight, while those fishing (OR=1.86; 95%CI=1.37-2.51) were still more frequently
139 overweight (Table 2). After also adjusting for sex and family education level, nature trips
140 (OR=0.52; 95%CI=0.36-0.76) and fishing (OR=1.56; 95%CI=1.14-2.13) were still
141 significant, gathering was not.

142

143 A total of 86 (9% of the study sample) was categorised as obese (BMI \geq 30). In models similar
144 to model 3 (adjusting for all outdoor activities, sex, family education level and general
145 physical activity level), the OR for being obese were respectively 0.48 (95%CI=0.24-0.98) for
146 those engaging in nature trips, 1.02 (95%CI=0.62-1.67) for those gathering, 0.97
147 (95%CI=0.58-1.63) for those fishing and 1.30 (95%CI=0.65-2.61) for those hunting.

148

149 **Discussion**

150 As far as we know, this is the first study reporting relationships between trips in nature and
151 traditional methods for food procurement and weight status.

152

153 Bringing your family on frequent trips to nature was associated with a 50% reduction in the
154 odds of being overweight and obese, also after adjusting for the behaviours gathering, fishing
155 and hunting, as well as for sex, family education level and general physical activity level.

156 Trips in nature are, at least for the majority of Norwegian, similar to hiking. Hiking has
157 recently been reported to be related to general subjective physical health, and those not
158 engaged in hiking had an OR of 2.14 (95%CI=1.47-3.12) for reporting poor subjective
159 physical health (13). Most Norwegians live close to nature (e.g. forest, sea shore or mountain
160 area), and therefore have the potential for engaging in trips in nature in their local area.

161 Hiking constitute an important and large part of Norwegians total physical activity level (14).

162

163 Gathering was also related to being less frequently overweight. However, this association was
164 affected by sex and family education level. Women and those in families with higher
165 education were both leaner and more engaged in gathering than men and those in families
166 without higher education. In most cases, gathering of wild plants and mushrooms are energy
167 demanding, i.e. energy is spent on transportation (walking) and picking, and for some wild
168 plants (e.g. cloudberry) the travel time between patches is considerable. There are lots of
169 edible wild plants and mushrooms in Norwegian nature, and the potential for gathering
170 appears large. It has e.g. been reported that there probably are enough blueberries and
171 cowberries alone to cover the national Norwegian recommendation for eating fruits (3).

172

173 Fishing was positively related to being overweight. This might be explained by the fact that
174 some fishing is today not necessarily very energy demanding. Fishing is now often conducted
175 from motorized boats, and people drive cars to the lake, river or sea. However, fishing in
176 small lakes on the mountain, only reached by foot, might be energy demanding. A limitation
177 of the present study is that we are not able to separate energy demanding fishing (and also
178 hunting) from non energy demanding fishing (and hunting).

179

180 Another limitation with the study is that it includes parents from two of Norway's 19 counties
181 only, and the results are therefore not necessarily generalizable to adults in Norway in
182 general. Also, the majority of the participants (78%) were female. Females hunt and fish less
183 than males and family related questions on hunting and fishing, rather than the individual
184 based questions used, might have altered the results. The data are cross-sectional, and we
185 therefore cannot draw any inferences about causality. All measures were self-reported, also
186 weight and height. Self reported measures are always prone to bias. E.g. the answering
187 alternative "sometimes" for the questions about gathering, fishing and hunting might have a
188 different meaning for different people. Also, some people (e.g. women and those overweight)
189 tend to underreport their weight more than others (15), which might have affected the results.

190 Only a few potential confounding factors were included in the present analysis (outdoor
191 activities, sex, family education level and general physical activity level). Including other
192 confounding factors (e.g. distance to nature and eating habits) might have altered the results.

193

194 **Conclusions**

195 Frequent family trips in nature might be an important behaviour in order to reverse the obesity
196 epidemic. However, longitudinal- and intervention studies are needed to further assess the
197 relationship between these activities and weight status.

198

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Table 1 Description of the variables and the unadjusted relationship between all variables assessed and weight status/outdoor activities (proportion of total sample, chi-square statistics).

		N	Weight status (%BMI≥25)	Family trips in nature (%≥once/week)	Gathering (%≥sometimes)	Fishing (%≥sometimes)	Hunting (%≥sometimes)
			42	22	56	42	14
Weight status	Not overweight	541		25	60	37	13
	Overweight	387		17	53	48	15
	p-value			0.002	0.05	0.001	0.32
Family trips in nature (≥once/week)	No	765	44		51	38	10
	Yes	211	32		78	56	25
	p-value		0.002		<0.001	<0.001	<0.001
Gathering (≥sometimes)	No	426	45	11		27	6
	Yes	550	39	30		53	20
	p-value		0.05	<0.001		<0.001	<0.001
Fishing (≥sometimes)	No	572	37	16	46		5
	Yes	405	48	29	72		26
	p-value		0.001	<0.001	<0.001		<0.001
Hunting (≥sometimes)	No	847	41	19	52	35	
	Yes	134	46	40	82	80	
	p-value		0.33	<0.001	<0.001	<0.001	
Sex	Males	210	63	25	56	61	28
	Females	760	35	20	56	36	10
	p-value		<0.001	0.15	0.90	<0.001	<0.001
Parents with higher education	None	373	49	18	45	39	10
	One or both	611	37	24	64	43	16
	p-value		<0.001	0.025	<0.001	0.18	0.005

Table 2 Logistic regression showing OR of being overweight (BMI ≥ 25) in relation to the traditional activities, sex and family education level

		Model I		Model II		Model III	
		OR	CI (95%CI)	OR	CI (95%CI)	OR	CI (95%CI)
Nordic outdoor activities	Trips in nature vs NO	0.53	(0.37, 0.76)	0.52	(0.36, 0.76)	0.54	(0.37, 0.79)
	Gathering vs NO	0.73	(0.54, 0.98)	0.85	(0.63, 1.16)	0.86	(0.63, 1.17)
	Fishing vs NO	1.86	(1.37, 2.51)	1.56	(1.14, 2.13)	1.55	(1.13, 2.12)
	Hunting vs NO	1.24	(0.83, 1.96)	1.03	(0.66, 1.62)	1.06	(0.67, 1.66)
Sex	Women vs men			0.32	(0.22, 0.45)	0.32	(0.22, 0.46)
Parents with higher education	One or both vs NO			0.63	(0.47, 0.85)	0.65	(0.48, 0.87)
General physical activity level	Times/week					0.93	(0.86, 1.01)

Model I - only containing the traditional activities as independent variables

Model II – contains model I + sex + family education level

Model III – contains model II + general physical activity level