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## 6 **Suitability Assessment of Printed Dietary Guidelines for Pregnant Women and** 7 **Parents of Infants and Toddlers from Seven European Countries**

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### INTRODUCTION

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12 The pregnancy period and the first years of a child's life are characterized by specific  
13 nutritional and dietary requirements and a need for safe food.<sup>1</sup> Most national health  
14 authorities publish printed dietary guidelines to inform pregnant women and new  
15 parents about specific dietary needs during this phase.

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17 These guidelines must be suitable for a heterogeneous population of pregnant  
18 women and parents in terms of literacy level, ethnicity, and previous knowledge  
19 about healthy eating. Previous studies show that printed health education materials  
20 are often produced with too little attention to their suitability for the intended target  
21 population.<sup>2-5</sup> The suitability of printed health promotion materials refers to how well  
22 the material can be understood and accepted by the reader and depends on many  
23 factors.<sup>6</sup> Health literacy is important in this context and includes people's knowledge,

24 motivation, and ability to access, understand, and apply health information.<sup>7</sup> Since  
25 most societies are increasingly multicultural, printed health materials should also be  
26 suitable for ethnic minority and immigrant populations.<sup>8</sup>

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28 Although the publication of printed health education materials has increased in recent  
29 years, their effectiveness has been questioned in the literature.<sup>9</sup> Reviews of the  
30 literature resulted in recommendations or principles for designing effective printed  
31 health educational materials.<sup>10-12</sup> However, this research focuses primarily on printed  
32 patient education materials with information about treatment rather than on health  
33 promotion.

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35 The suitability assessment of materials (SAM) instrument is a validated method for  
36 evaluating written health-related education materials.<sup>6</sup> It is used to evaluate printed  
37 materials in terms of categories and factors known to enhance people's  
38 understanding of printed materials.<sup>6</sup> The SAM has previously been used to evaluate  
39 patient information and information to promote physical activity.<sup>2-4,13-15</sup> No  
40 publications were found in which SAM was applied to printed dietary guidelines. The  
41 aim of this study was to use the SAM method to evaluate selected European printed  
42 dietary guidelines for pregnant women and parents of infants and toddlers. The  
43 findings are discussed in relation to possible critical factors in development of new  
44 dietary guidelines as emphasized by the SAM instrument.

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## METHODS

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Printed dietary guidelines for pregnant women and parents of children between the ages of 0 and 6 years were collected from 7 European countries between October 2011 and February 2012. The guidelines were downloaded or ordered from the websites of public health authorities in Austria, Germany, and Switzerland (German language), Denmark, Norway and Sweden (Scandinavian languages), and the United Kingdom (English language). Materials included in the assessment had to be 1) be produced by national public health authorities and distributed free of charge; 2) provide dietary guidelines for pregnant women and parents of children between 0 and 6 years; and 3) be written in English, German, or a Scandinavian language.

Three public health nutritionists, who could read all of the five languages, assessed the dietary guidelines using the SAM instrument based on an adapted protocol.<sup>16</sup> The protocol was pilot tested on two separate materials to identify and standardize interpretation of the factors. All 14 materials were evaluated and scored independently by the 3 investigators. The final scores were based on the mean of the scores. The SAM method rates written materials on 22 factors grouped in 6 categories: “content”, “literacy demand”, “graphics”, “layout and typography”, “learning stimulation and motivation”, and “cultural appropriateness”. Each factor is rated as *superior* (2 points), *adequate* (1 point), or *not suitable* (0 points). Factors that do not apply to the material are rated not applicable. The total possible score is 44, from which 2 points per nonapplicable factor can be deducted. The original SAM

71 protocol includes a rating measured with the Fry formula of the readability level  
72 suitable for English-language materials.<sup>17</sup> This rating was removed from the scores  
73 since materials in different languages were assessed. As in the SAM protocol by  
74 Smith, the factor “scope” was removed since it proved difficult to score.<sup>16</sup> Thus, the  
75 maximum possible score was 40. The overall suitability of a material and each  
76 category were presented as a percentage of the maximum possible score. The  
77 materials were rated as either *superior* (70–100 %), *adequate* (40–69 %), or *not*  
78 *suitable* (0–39 %).

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80 The “content” category assessed whether the purpose of the material was explicitly  
81 stated, the information provided was behavior-focused, and a summary of the  
82 materials’ key messages including examples was present. In this study, “literacy  
83 demand” was assessed based on writing style (eg, mostly conversational style and  
84 active voice), sentence construction (eg, the context is given before new information  
85 is given), the use of vocabulary (eg, common words are used; avoidance of technical  
86 words and jargon), and the use of learning aids such as headers or topic captions. In  
87 the “graphic” category, the cover graphic (eg, cover graphic is friendly and attracts  
88 attention) as well as the type of illustration (eg, simple line drawings without  
89 distracting details) and their relevance were rated. “Graphics” were also rated on  
90 whether they include step-by-step instructions for actions with examples and  
91 explanatory captions. “Layout” (eg, visual cuing devices are used to direct attention to  
92 specific points or key content) and “typography” (eg, text type and size) were  
93 assessed. Within this factor, materials were also rated on whether they included long  
94 lists without descriptive subheadings. The assessment of “learning stimulation and  
95 motivation” considered whether interaction was included in the text (eg, problems or

96 questions) and whether desired behavior patterns are modeled (eg, changing eating  
97 patterns, shopping and cooking practices). The assessment of the materials'  
98 motivation involved whether complex topics were subdivided so that readers may  
99 experience that the tasks are doable. "Cultural appropriateness" measured how well  
100 the materials' logic, language, and experience matched the "logic, language and  
101 experience" (LLE) of the target audience. Researchers searched the materials  
102 explicit for reference to a target audience. If not found, a general population, which is  
103 multi-cultural in all the selected countries, was assumed. Images of people,  
104 illustrations and suggested foods were assessed for whether they accommodated  
105 diverse cultures.

106

107 Inter-rater reliability between the 3 investigators was assessed using Cohen's kappa  
108 ( $\kappa$ ) in SPSS 22.0 for Windows (Chicago, IL).<sup>18</sup> Cohen's  $\kappa$  ranges strength of  
109 agreement from 0 to 1.0 with coefficient's  $\leq 0.20$  indicating poor agreement,  
110 0.21–0.40 indicating fair agreement, 0.41–0.60 indicating moderate agreement,  
111 0.61–0.80 indicating good/substantial agreement, and 0.81–1.0 indicating almost  
112 perfect agreement.<sup>19</sup> Cohen's  $\kappa$  was calculated for each pair of investigators in each  
113 category of variables (category-specific). Review by an Institutional Research Board  
114 was not required for this study because human subjects were not involved, as per  
115 (blinded information).

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## RESULTS

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121 The researchers assessed 1 printed dietary guideline for pregnant women and 1 for  
122 parents of infants and toddlers from each of 7 countries, in total 14 materials. The  
123 format of the materials (brochures, booklets, books, flyers) varied greatly in length,  
124 from 2 to 122 pages, as well as the content. All of the materials for pregnant women  
125 included topics other than dietary guidelines. Materials for parents of infants and  
126 toddlers were usually organized according to the child's age, with a general emphasis  
127 on breastfeeding and the introduction of solid foods. Most of the 14 materials  
128 provided food-based dietary advice.

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130 The category-specific inter-rater reliability on the SAM categories ranged from  
131 Cohen's  $\kappa$  0.37 to 0.62 (mean = 0.41) indicating a variation between categories from  
132 fair to moderate agreement among the 3 investigators with the exception of good  
133 agreement on content.

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135 The SAM results are presented in Table 1. Five of the materials were rated *superior*,  
136 9 *adequate*, and none *not suitable*. The mean overall SAM score for the materials for  
137 pregnant women was *adequate* (61%), and the mean overall SAM score for the  
138 materials for parents of infants and toddlers was *adequate* (67%).

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Table 1 approximately here

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142 Most of the materials (n=10) scored *superior* (74%) for the presentation of the  
143 “content”. The purpose of the material was stated in the title, and the context was  
144 often presented in a behavior-related context.

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146 Seventy percent of the materials scored *superior* on “literacy demand.” Nine  
147 materials were rated *superior*, characterized by the use of conversational style and  
148 active voice, presentation of the context before new information, and the use of  
149 advance organizers (eg, headers or topic captions). The factor that led to lower  
150 ratings was the lack of the use of common vocabulary and the explanation of  
151 technical words.

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153 The mean score for the use of “graphics” was *adequate* (56%). Only a few materials  
154 provided simple drawings and presented key messages in illustrations. In several  
155 materials, “graphics” were presented without explanations or captions. Another  
156 common feature of the materials was a lack of step-by-step instructions with  
157 examples. For example, although the materials encourage pregnant women to eat 5  
158 servings of fruits and vegetables a day, only a few materials provided suggestions.  
159 The materials got the highest mean SAM score in the category “layout and  
160 typography” (75%).

161

162 The mean score for the application of “learning stimulation and motivation” was 59%,  
163 (*adequate*). Only 4 materials scored *superior* in this category. The 2 materials rated

164 *not suitable* lacked interaction and learning stimulations, such as a question-and-  
165 answer format to present problems and solutions.

166

167 The poorest ratings were for “cultural appropriateness.” The overall SAM score was  
168 *adequate* (45.7%), and 6 materials were evaluated as *not suitable*. None of the  
169 materials clarified a specific target audience. Only few included images of people of  
170 different ethnic backgrounds or provided examples of how the dietary  
171 recommendations could be adapted to different food cultures (eg, provided examples  
172 of how to eat wholegrain based on staples used by different food cultures). However,  
173 we found that some of the materials were available in several different languages  
174 (n=5).

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## DISCUSSION

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180 To our knowledge, this is the first publication that used the SAM method to evaluate  
181 printed dietary guidelines. Overall, the assessed materials were scored as *adequate*  
182 in relation to the target groups’ assumed needs. None of the materials was scored  
183 *not suitable*. Among the categories, the highest average scores were in the “layout  
184 and typography,” and the lowest average scores were for “cultural appropriateness”  
185 and “learning stimulation and motivation.”



186

187 Previous studies using the SAM instrument on written patient education materials find  
188 that they often are weak on aspects of health literacy.<sup>2-5</sup> Attractive materials enhance  
189 readers' attention to, understanding of, and recall of the information.<sup>12,20</sup> In this study,  
190 the materials scored highest in the "content" (74%) and "layout and typography"  
191 (75%) categories. High scores were achieved because several of the materials  
192 presented the content in a behavior-related context and in a easy to read font. Even  
193 though 70% materials scored *superior* for "literacy demand", higher scores would  
194 have been achieved by more use of common vocabulary and explanation of technical  
195 words.<sup>6</sup> Scores in the "graphics" category show that only a few materials used  
196 illustrations to overcome barriers related to low health literacy levels. Even though  
197 readability is another important aspect of health literacy, the researchers deducted  
198 this factor in this study due to the different languages used.

199

200 One of the categories that scored lowest in this study was "learning stimulation and  
201 motivation" (*adequate*, 59%). The SAM approach emphasizes that printed materials  
202 should stimulate and motivate readers, and this can be achieved by presenting the  
203 information in a question-and-answer format and by modeling how to change a  
204 targeted behavior (eg, eating habits).<sup>6</sup> Previous research indicates that pregnant  
205 women in particular may experience information overload leading to lower motivation  
206 to focus on healthy eating.<sup>21,22</sup> The substantial difference in the material length is also  
207 worth noticing, as comprehensive written materials could influence the reader's ability  
208 and motivation to engage with message.<sup>7</sup> However, the number of words was not  
209 assessed in this assessment tool.

210

211 The materials scored lowest in the category “cultural appropriateness” (46 %). There  
212 has been a growing recognition that health promotion materials should be culturally  
213 sensitive.<sup>23-25</sup> Other studies have pointed to that printed patient education material  
214 lack consideration of minority group’s needs or account for cultural diversity in a  
215 population group.<sup>2,3,26</sup> However, “cultural appropriateness” was the factor with the  
216 highest inconsistency in scoring among the researchers, as also found in previous  
217 studies.<sup>3,27</sup> We judge that a core factor, was initial difficulty in determining the  
218 material’s target audience. Lack of images of people with different ethnic background  
219 or suggested food items suitable for different cultures contributed to the low scores in  
220 this category. The use of step-by-step illustrations is suggested by the SAM  
221 methodology to help overcome language barriers.<sup>6</sup> Some materials in this study were  
222 available in other languages, but this is not accredited in the SAM scores.

223

224 The limitations of this study have to be considered. The SAM is a subjective  
225 evaluation tool.<sup>3,4</sup> As in previous studies that use the SAM tool,<sup>2-5,28</sup> users were not  
226 involved in assessing the material. The number of investigators scoring the materials  
227 independently in this study is comparable with other studies using SAM as an  
228 evaluation tool,<sup>4,5,14,29</sup> but the inter-rater reliability scores were slightly lower than in  
229 previous studies presenting the same analyses.<sup>4,29</sup> The inclusion of another factor to  
230 assess the quality of the content in the scoring scheme should be considered for  
231 future studies.

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## IMPLICATION FOR RESEARCH AND PRACTICE

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238 This research demonstrates that the suitability of the assessed printed dietary  
239 guidelines was *adequate* according to the SAM tool. However, findings indicate a  
240 potential to enhance the suitability of such materials with use of less technical words  
241 and more use of common language, and adding features to stimulate and motivate  
242 the reader. Simple graphics to illustrate dietary changes as well as dietary  
243 recommendations based on different food cultures may overcome cultural barriers  
244 and increase the suitability for low health literacy populations.

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Table 1  
 SAM Scores<sup>a</sup> For Each Category and Overall SAM Scores in Percentage of the Total Possible Scores.

Material and Source	Content	Literacy Demand	Graphics	Layout and Typography	Learning Stimulation and Motivation	Cultural Appropriateness	Total score
<a href="#">Pregnant, Norwegian Directorate of Health, 2009.</a>	100	96	70	89	83	75	85
<a href="#">The best diet for your baby, Federal Ministry of Food and Agriculture, Germany, 2011.</a>	83	71	80	100	67	58	78
<a href="#">Good food for infants, National Food Agency Sweden, 2011.</a>	72	71	77	100	67	50	74
<a href="#">Food for infants and toddlers, Danish Health and Medicines Authority, 2012.</a>	72	79	63	89	50	83	72
<a href="#">Food for infants, Norwegian Directorate of Health, 2001.</a>	78	83	67	67	72	42	70
<a href="#">Dietary guidelines for mother and child, Research Institute for child nutrition, Germany, 2010.</a>	89	46	73	83	61	42	67
<a href="#">The right diet from the beginning! Federal Ministry of Health, Austria, 2010.</a>	61	75	57	83	78	33	66
<a href="#">Dietary advice for pregnant women, National Food Agency Sweden, 2008.</a>	83	75	60	56	61	33	63
<a href="#">Building blocks for a better start in life, National Health</a>	56	75	50	78	61	42	61

<a href="#">Service United Kingdom, 2010.</a>							
<a href="#">Healthy habits – prior, during and after pregnancy, Danish Health and Medicines Authority, 2010.</a>	83	71	43	61	72	33	61
<a href="#">Eating while you are pregnant, booklet, Food Standards Agency, United Kingdom, 2007.</a>	83	67	47	78	50	33	60
<a href="#">Nutrition in pregnancy and lactation, Federal Council Switzerland, 2008.</a>	72	46	50	50	33	33	49
<a href="#">Tips for diet and physical activity in pregnancy and in the first years, Federal Office of Public Health, Switzerland, 2011.</a>	67	63	23	44	44	50	47
<a href="#">The Austrian Nutrition Pyramid for Pregnant Women, Federal Ministry of Health, Austria, 2011.</a>	39	58	30	72	28	33	43
Mean Score (total)	74	70	56	75	59	46	64
Mean Score (infants/toddlers)	70	74	60	80	63	51	67
Mean Score (pregnant)	78	61	53	70	55	40	61

<sup>a</sup>Suitability scores: 70–100%, *superior*; 40–69%, *adequate*; 0–39%, *not suitable*.