RESEARCH
Original Research

Use of the Nutrition Care Process and Nutrition Care Process Terminology in an International Cohort Reported by an Online Survey Tool

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ABSTRACT

Background Dietitians in countries across the world have been implementing the Nutrition Care Process (NCP) and Terminology (NCPT) during the past decade. The implementation process has been evaluated in specific countries and in smaller international studies; however, no large international study comparing implementation between countries has been completed.

Objective The aim of this study was to describe and compare the level of NCP/NCPT implementation across 10 countries.

Methods A previously tested web-based survey was completed in 2017 by 6,719 dietitians across 10 countries. Participants were recruited through e-mail lists, e-newsletters, and social media groups for dietitians. Nondietitians were excluded through screening questions and targeted dissemination channels.

Main outcome measures and statistical analysis The main outcome of interest was the level of implementation of each of the four NCP steps. Differences in implementation between the NCP (process) and NCPT (terminology) were also measured. Differences between groups were assessed using Kruskal-Wallis test and Mann-Whitney U test. Multiple linear regression was used to assess relationships between the main outcomes and respondent demographic information.

Results Australia, New Zealand, and the United States had higher implementation rates compared with other countries surveyed. Awareness of the NCP was high in most countries (>90%) but lower in Greece (50%). All countries had a higher implementation level of the NCP (process) compared with the NCPT (terminology). Dietitians working with inpatients reported the highest implementation levels while those working in public health reported the lowest.

Conclusions Dietitians in countries with more experience in NCP/NCPT implementation and a clear implementation strategy had higher levels of implementation. To achieve a successful NCP/NCPT implementation among dietitians, there is a need to promote the value of a standardized dietetic language together with the more easily implemented process. There is also a need to promote NCP/NCPT for all areas of practice, and develop strategic plans for implementation of the NCP and NCPT.

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THE NUTRITION CARE PROCESS (NCP) AND ITS ASSOciated terminology (NCPT) were presented by the Academy of Nutrition and Dietetics (formerly the American Dietetic Association) (Academy) in 2003 to provide dietitians with a framework for critical thinking and decision making.[1] The NCP consists of four main steps: Nutrition Assessment, Nutrition Diagnosis, Nutrition Intervention, and Nutrition Monitoring and Evaluation. The NCPT provides standardized terms for each of these four steps. This work built onto previous models describing the process of nutrition and dietetics care to identify the unique contribution of dietetics to overall health care outcomes.[2]

The NCP/NCPT was developed in the United States, and subsequently the International Confederation of Dietetic Associations recommended NCP/NCPT adoption in 2011.[3] Other similar models and terminologies have been implemented in some countries, indicating a need among dietitians for a framework identifying and describing the dietetic care process.[4-6] There is increasing interest to incorporate international perspectives in the further development of NCP/NCPT, to make it a globally valuable tool. The Academy's Nutrition

Care Process and Terminology and Research Outcomes (NCPRO) Committee maintains the standardized terminology for each step of the NCP. In 2012, an international workgroup was formed by the Academy to provide the NCPRO Committee with information on the perspectives and needs of the increasing international community using the NCP/NCPT. In 2013, two international representatives from this workgroup were included on the NCPT Committee to ensure global perspectives were integrated in the future development of NCP/NCPT. Today, three international representatives are included, representing half the members of this committee.

Studies exploring dietitians' experiences with the NCP/NCPT have shown that they see benefits, including clear professional communication of nutrition in clinical records, increased recognition of dietetics-related expertise, and the appreciation for a clear framework to guide dietitians in critical thinking.[7-9] At the same time, Swedish dietitians have expressed difficulties combining the ideals of a standardized nutrition care process and terminology with other values in health care, such as a person centered language and a flexible approach adapting to the individuals' needs.[7] A study conducted in Australia found that dietitians' NCP/NCPT familiarity, knowledge, confidence, and preparedness for implementation increased over a 3-year period.[10]

The NCP/NCPT implementation process has been evaluated in a few countries, using different approaches, including national surveys, clinical record audits, and qualitative focus groups. In 2011, Dietitians of Canada administrated a national survey to measure NCP/NCPT implementation in Canada (n=209 respondents). This survey found that 79% of respondents knew about the NCP, and 84% were using or thinking about using the standardized terminology.[11] This survey also found that Nutrition Diagnosis was the most implemented NCP step, out of which 33% of dietitians reported using Nutrition Diagnosis in clinical documentation. A similar Swedish national survey (n=343 respondents) in 2011 showed that 68% of respondents reported knowing about the NCP, and in a repeated survey in 2013 (n=449 respondents) this number had increased to 92%.[12,13] Also in Sweden, the most-used NCP step was the Nutrition Diagnosis, with 16% of dietitians in 2011 and 28% in 2013 reporting having implemented this step in their dietetic practice. In an Australian study, NCP/NCPT use before and after an implementation initiative in Queensland was investigated. This initiative included training of local champions as well as education sessions for 279 district dietitians. The study showed a clear increase in NCP/NCPT familiarity and use among dietitians after the initiative.[8] A follow-up survey was also conducted 3 years later, which demonstrated an increase in the percentage of dietitians using the Nutrition Diagnosis step for 6 months or more (17.5% in 2011 compared with 83.1% in 2014).[14]

NCP/NCPT attitudes and implementation have previously been explored across countries; however, the earlier survey tool was developed in English, with a key focus on Nutrition Diagnosis implementation.[15] At the time of this previous study, some countries hesitated to participate, due to the survey only being available in English. The possibilities of using electronic survey tools were also limited at that time (personal communication with Angela Vivanti, DHSc, AdvAPD, August 18, 2017).

RESEARCH SNAPSHOT

Research Question: What is the level of Nutrition Care Process (NCP) and NCP Terminology (NCPT) implementation across 10 countries?

Key Findings: Australia, New Zealand, and the United States had higher implementation compared with other countries surveyed. Awareness of NCP was high (>90%) in most countries but lower in Greece (50%). There was a higher implementation level of the NCP (the process) compared with the associated terminology. Dietitians working with inpatients reported the highest implementation levels, whereas those working in public health reported the lowest.

An international investigation of the implementation of NCP/NCPT is important for the advancement of the global dietetic profession. Although the NCP (process) and the NCPT (terminology) are closely connected, they can also be seen as two distinct entities. No previous study has explored implementation of these two entities separately, which could provide valuable information about the relationship between the NCP model and NCPT. In addition, only very few studies have explored dietitians' use of standardized working processes and terminologies across several countries with different languages and cultures.[16]

The aim of this study was to describe and compare the level of NCP (process) and NCPT (terminology) implementation across 10 countries.

METHODS

A thoroughly tested online survey tool (mounted on SurveyMonkey.com) was disseminated to dietitians in Australia, Canada, Denmark, Greece, Ireland, New Zealand, Norway, Sweden, Switzerland, and the United States. The study was initiated by the researchers from Australia, Canada, Sweden, and the United States, with representatives from the other countries recruited from earlier or ongoing NCP related collaborations; for example, through the Academy's NCPRO International Workgroup and the Nordic NCP Network.

Context

Due to the multinational approach of this study, the national context of the survey findings varies substantially between countries. Therefore, in each country, national background information, including total number of dietitians and NCP/NCPT implementation strategies were collected from national dietetic associations and other authoritative bodies such as ministries of health. An overview of this information is shown in Table 1. For example, the number of dietitians in each country varied from ~500 (Norway) to more than 97,000 (United States). In most included countries, NCP/NCPT was introduced between 2009 and 2014, but in Greece, it has not yet been officially introduced. Most included countries have an NCP implementation strategy, such as a working group or committee coordinating the implementation, although the details of implementation strategy vary between countries. In some countries, such as Ireland, employed dietitians coordinate the national NCP/NCPT implementation, although in most

Table 1. National background information for countries included in the International Nutrition Care Process and Terminology (NCP/NCPT) Implementation survey 2017[a]

Country	Total number of dietitians[b]	NCP first introduced	NCP implementation strategy	Official NDA[c] position statement regarding NCP implementation	NCPT access	NCP taught at universities/ HEI[d]	NCPT translation
Australia	5,500	2009	Initiated by NDA, which has organized NCP working group, NCP champions, and education sessions	No	Access to the eNCPT[e] is incorporated in the NDA membership	Yes, but not all HEIs	English: N/A
Canada	12,000	2006 (some regions)	Initiated by NDA who organized an NCP/NCPT Leadership Committee in 2008 (still currently meets)	Yes, in 2010	Access to the eNCPT is incorporated in the NDA membership	Yes, all HEIs	English: N/A French: Yes, first version published in 2012. Terms and definitions for all NCP steps translated
Denmark	1,100	2003 (1 HEI)	First initiated by a single teacher in dietetics education. NDA adopted in 2013, started NCP working group	Yes, in 2013	There are 2 different NDAs, and access to the eNCPT is incorporated in both memberships (as of October 1, 2018, the two different NDAs have merged into one single organization)	Yes, all HEIs	Danish: Yes, first version published in 2016. Terms and definitions for all NCP steps translated
Greece	700	Not yet	No	No	There is no formal way for eNCPT access	No	Greek: No
Ireland	800	2014	Initiated by NDA in collaboration with Nutricia Advanced Medical Nutrition. Continuous professional development funding was awarded by the Irish Health Service to employ someone on a part-time basis to coordinate implementation.	Yes, in 2014	A national eNCPT license has not been agreed yet. Currently, selected pilot sites in Ireland have individual subscriptions to the eNCPT.	Yes, all HEIs	English: N/A

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Table 1. National background information for countries included in the International Nutrition Care Process and Terminology (NCP/NCPT) Implementation survey 2017[a] (*continued*)

Country	Total number of dietitians[b]	NCP first introduced	NCP implementation strategy	Official NDA[c] position statement regarding NCP implementation	NCPT access	NCP taught at universities/ HEI[d]	NCPT translation
New Zealand	600	2010	Initiated by NDA, which organized education sessions and an NCP work group	No	Access to the eNCPT is incorporated in the NDA membership	Yes, all HEIs	English: N/A
Norway	500	2014	The NCP was included in the curriculum at the university in Oslo in 2012. In 2013 the NDA created a NCP group with aim to translate NCPT and make NCP/NCPT available to students and members of NDA	Yes, in 2016	Access to the eNCPT is incorporated in the NDA membership	Yes, at all HEIs	Norwegian: Yes, first version completed 2014 (published 2016). Only terms and definitions for Nutrition Diagnosis and Nutrition Intervention translated.
Sweden	1,100	2011	Initiated by NDA in collaboration with Karolinska University hospital. NDA informatics group coordinates regular education sessions and NCPT translation.	Yes, in 2013	Access to the eNCPT is incorporated in the NDA membership	Yes, at all HEIs	Swedish: Yes, first version published in 2011. Terms and definitions for all NCP steps translated.
Switzerland	1,200	2012	Initiated by 3 registered dietitians in 2013. NDA adopted in 2014 and started NCP working group that coordinates education sessions and translation	Yes, 2015	Access to the eNCPT is incorporated in the NDA membership	Yes, all 3 HEIs	French: The French-Canadian translation is used. German-Swiss: Not finished yet. Only terms and definitions for Nutrition Diagnosis and Nutrition Intervention translated 2017. Italian: Only terms for Nutrition Diagnosis and Nutrition Intervention translated in 2014, but not updated since then.

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Table 1. National background information for countries included in the International Nutrition Care Process and Terminology (NCP/NCPT) Implementation survey 2017[a] (*continued*)

Country	Total number of dietitians[b]	NCP first introduced	NCP implementation strategy	Official NDA[c] position statement regarding NCP implementation	NCPT access	NCP taught at universities/ HEI[d]	NCPT translation
United States	97, 000[f]	2003	Initiated by NDA, which organized NCP/NCPT Committee. Several persons employed to work with NCP development and implementation	Yes, 2003	Dietitians purchase annual eNCPT subscription, NDA members get discount	Yes, all HEIs with accredited programs	English: N/A

[a]The information in Table 1 has been collected from national dietetic associations and NCP workgroups in the included countries.
[b]Estimated number of dietitians for the time of the study.
[c]NDA=National dietetic association.
[d]HEI=Higher education institution.
[e]eNCPT=Electronic version of the Nutrition Care Process Terminology document.
[f]This number is collected from the Academy of Nutrition and Dietetics Fiscal Year 2016 Annual Report, page 10 (The Academy of Nutrition and Dietetics. The Academy of Nutrition and Dietetics Fiscal Year 2016 Annual report. https://www.eatrightpro.org/-/media/eatrightpro-files/about-us/annual-reports/annualreport-2016.pdf?la=en&hash=AF58BF192B7A8C78B901CB26ED59DF7B6FAB0225. Published 2016. Accessed October 15, 2018).

countries implementation is not nationally coordinated and local implementation work is performed by volunteers.

Participants and Dissemination

Registered or accredited dietitians (or equivalent in the countries where registration is not mandated), in the participating countries were invited to take part in this study. To invite as many dietitians as possible in the included countries, several different recruitment strategies were used. For practical reasons, in Australia and Switzerland, the invitation was sent only to members of the national dietetic associations, whereas in the other countries, registered or accredited dietitians who were not members of the national dietetic associations were also invited to participate. In all countries, an invitation letter or advertisement with a link to the web-based survey was disseminated through e-mail lists and e-newsletters via the national dietetic association or the national regulatory body. In the United States, e-mail invitations were sent directly to dietitians using an e-mail list obtained by the Commission on Dietetic Registration, the credentialing body of dietitians in the United States. In Canada, Denmark, Greece, Norway, and Sweden, the letter was also advertised through other channels such as local dietetic networks and on professional groups in social media. The invitation letter was first written in English by the study coordinator (E. L.) and then critically revised by all authors. After revisions, the letter was translated to the local languages by the researchers, who had all participated in critical revision of the original letter, or by a professional translator. No further validation was performed for these translations. Subject line for the invitation was "Survey about NCP and NCPT implementation." Time estimated to complete the survey was 20 minutes; this information was included in the invitation. After both 3 and 6 weeks, reminders to complete the survey were sent out through the same channels. In the United States, reminders were not sent out, due to the huge number of invitations sent initially in this country. The online survey tool opened on February 1, 2017, and remained open for 10 weeks. No incentives such as money or gifts were offered for participation.

The first page of the online survey consisted of an information letter and to enter the survey, participants had to provide informed consent to participate in the study. In practice, this meant that they were asked to tick a box stating that they had read the information letter and agreed to participate in the survey. In the case that a participant did not, or in the case that the participant responded "no" to this question, he or she was directed to the end of the survey.

The Survey Tool

The International NCP/NCPT Implementation Survey (INIS) tool was developed and tested in an earlier study, showing high reliability and content validity in different languages and dialects (English, Danish, Canadian/Swiss French, Swiss German, Greek, Norwegian, and Swedish), and in all countries included in this study.[17] The development included expert assessment as well as cognitive interviews and pilot surveys. The INIS tool consists of four different modules: demographic characteristics (Module 1), NCP/NCPT implementation (Module 2), NCP/NCPT attitudes (Module 3), and

NCP/NCPT knowledge (Module 4). The results presented in this article focus on NCP/NCPT implementation.

To make sure that only registered/accredited dietitians participated in the survey, two control questions were included at the beginning of the survey. Respondents who reported not being registered/accredited dietitians, or who had not completed any dietetics-related education, were automatically directed to the end of the survey and excluded from all analyses.

NCP/NCPT Implementation (Dependent Variables)

The main outcome of interest for this study was the level of implementation of each of the four NCP steps and the NCPT. Respondents were first asked about their awareness of the NCP (process). In the case that they were not aware of the NCP, respondents were directed to the end of the survey. In the case that they were aware of the NCP, respondents were asked questions about their level of implementation. These questions focused on to what extent they used the NCP (process) and NCPT (terminology) respectively. For both the process and the terminology, respondents were asked to indicate level of use (1=never, 2=rarely, 3=occasionally, 4=often, and 5=always) for each NCP step (ie, Nutrition Assessment, Nutrition Diagnosis, Nutrition Intervention, and Nutrition Monitoring and Evaluation). Definitions of the NCP steps were provided adjacent to each of these questions (see Figure 1[18-20]). Respondents who reported not being aware of the NCP were automatically placed in the group who reported never using the NCP/NCPT.

The reported implementation level regarding each of the four NCP steps were analyzed both separately and grouped together to indicate overall implementation level. This was done separately for NCP and NCPT, respectively. A maximum total score of 20 was calculated by summarizing the indicated implementation level (between 1 and 5) for each NCP step.

NCP Step	NCP Explanation[a]	NCPT Explanation[a]
Nutrition Assessment	The systematic collection of important and relevant data, and the analysis/interpretation of the collected data	Using the standardized terms in the documentation of the collection of data and the analysis/interpretation of the collected data Examples: • Total energy intake • Meal/snack pattern • Measured weight
Nutrition Diagnosis	Identifying the nutrition problem, determining the etiology/cause, and stating signs/symptoms	Using the standardized terms in the documentation of the nutrition problem, etiology/cause, and signs/symptoms Example: Inadequate energy intake related to only drinking liquids due to swallowing difficulties and nausea, as evidenced by patient's energy intake lower than 70% of estimated need
Nutrition Intervention	Determining intervention and prescription, formulating goals, and determining and implementing action	Using the standardized terms in the documentation of the intervention, prescription and goals, and determining and implementing actions Examples: • Increased energy diet • Modify composition of enteral nutrition • Nutrition education
Nutrition Monitoring and Evaluation	Selecting or identifying quality indicators and monitoring and evaluating the resolution of the nutrition diagnosis	Using the standardized terms in the documentation of quality indicators, monitoring, and evaluation of the resolution of the nutrition diagnosis Examples: • Total energy intake • Meal/snack pattern • Measured weight

[a]These definitions were provided in the International Nutrition Care Process and Terminology (NCPT) Implementation Survey 2017.[18-20]

Figure 1. Definitions of the Nutrition Care Process (NCP) steps. These definitions were provided in the International Nutrition Care Process and Terminology (NCPT) Implementation Survey 2017.[18-20]

Respondents were also asked to indicate the duration of their NCP/NCPT implementation (1=not using and do not plan to implement, 2=not using but plan to implement, 3=<1 year, 4=1 to 5 years, 5=>5 years, and 6=have used before, but do not anymore). Respondents reporting they were not aware of the NCP were automatically placed in the group who reported not using the NCP/NCPT and do not plan to implement it.

Demographic Information (Independent Variables and Covariates)

Demographic information that was requested from respondents included country of residence, highest level of completed dietetics/nutrition education, years since completed dietetics training, and area of practice.

Data Analysis

Data were transferred from the online survey tool to a Microsoft Excel workbook and coded by the first author. Missing data were handled by average or common-point imputation.[21] Descriptive statistics were used to describe respondent characteristics and provide basic details regarding the main outcomes (NCP/NCPT implementation). Differences between groups were assessed using Kruskal-Wallis and Mann-Whitney U tests. *P* values were adjusted for multiplicity and level of significance was established at $P<0.05$.[22]

To assess the relationships among the main outcomes and demographic variables, multiple linear regression was used. In this analysis, the four steps of NCP were summarized to indicate overall implementation of the NCP (process) or NCPT (terminology). All statistical analyses were performed using SPSS version 22.[23]

Ethics

The ethics review board in Uppsala, Sweden, approved the entire study protocol before the dissemination of the survey (Dnr 2016/258). In addition to this, discussions with local ethics review boards were held in all included countries, resulting in formal local ethics approvals in Canada (University of Waterloo Office of Research Ethics, ORE: 21558) and the United States (Case Western Reserve, Institutional Review Board, Cleveland, OH). In Australia, local ethics approval for an earlier study (valid 2014-2017, Centres for Health Research, Princess Alexandra Hospital; HREC/14/QPAH/262), together with the Swedish approval, was considered adequate. In the other included countries, the study was either deemed exempt according to local research ethics laws, or local ethics boards indicated that no further approvals were needed as the main study was already approved in Sweden.

To ensure anonymity for respondents, Internet protocol addresses were not collected. All participants electronically provided informed consent before participation.

RESULTS

Demographic Information

In total, 6,719 dietitians entered the survey. Of these, 221 were excluded due to not meeting the inclusion criteria or not completing the first survey question. Survey Modules 1 and 2 were only partially completed by 39 and 1243 respondents, respectively. Thus, Module 1 was fully completed by 6,459 respondents and module 2 by 5,255 respondents. Average time to complete the survey was 22.5 minutes. In Australia, Canada, Denmark, and United States, <10% of the target populations responded to the survey, whereas in Greece, Ireland, New Zealand, Norway, and Switzerland, ~10% to 20% responded. Sweden had the best response rate with approximately 30% of dietitians responding to the survey. The size of the dietetics profession in different countries was reflected in the survey responses, with the majority of respondents coming from the United States. An overview of the demographic information for each country as well as the overall international sample is provided in Table 2. A comparison of survey demographic information and the characteristics of the dietetics profession in the included countries confirmed that the responses were likely to be representative for the target populations regarding the proportion of education levels, for example. For a few countries, dietitians working in clinical practice seemed somewhat overrepresented compared with other areas of practice. However, because exact demographic statistics were unavailable in most included countries, this is an approximate assessment based on discussions with the national dietetic associations.

Almost half of respondents (45%) reported more than one area of practice. In addition, most respondents reported working in patient-related activities (>75%). Community work and consultation and business practice were the second and third most common areas of practice, respectively. Most respondents reported having a bachelor's or master's degree in nutrition/dietetics. About one-third of respondents had completed their training to be able to practice as dietitians within the previous 6 years.

NCP/NCPT Awareness and Implementation

In all countries except Greece, >90% of respondents reported being aware of the NCP. In Greece, 50% reported being aware of the NCP.

In all countries, dietitians reported more often incorporating the NCP (process) compared with the associated NCPT (terminology) (Mann-Whitney U test $P<0.001$) (Figure 2). There was also a statistically significant difference in implementation level across the four NCP steps (Kruskal-Wallis test $P<0.001$) (Figure 2). Nutrition Assessment recorded the highest mean rank for NCP (process) use, followed by Nutrition Diagnosis, Nutrition Intervention, and Nutrition Monitoring and Evaluation. Of note, 71% reported using Nutrition Assessment frequently or always. For the terminology (NCPT), the Nutrition Diagnosis step recorded the highest mean rank, followed by Nutrition Assessment, Nutrition Intervention, and Nutrition Monitoring and Evaluation ($P<0.001$). The proportion of respondents who reported to frequently or always using the Nutrition Diagnosis terminology was 60%. This pattern for NCPT terminology with Nutrition Diagnosis being the most frequently used NCP step, was similar in all countries. The only exception from this was Ireland, where Nutrition Assessment was reported to be the most implemented NCP step also for the terminology (data not shown).

The NCP (process) was associated with a longer time of implementation compared with the NCPT (terminology) (Mann-Whitney U test $P<0.0001$). About two-thirds of all respondents reported having used all four steps of the NCP

Table 2. Demographic information of participants completing the International Nutrition Care Process and Terminology Implementation Survey 2017

Demographic information	Total	Australia	Canada	Denmark	Greece	Ireland	New Zealand	Norway	Sweden	Switzerland	United States
	n										
Level of education in nutrition/dietetics	6,498	150	516	74	125	93	106	86	316	233	4,799
	n (%)										
Bachelor's degree/ postgraduate	3,435 (52.8)[a]	93 (62.0)[a]	414 (80.2)[a]	53 (71.6)[a]	48 (38.4)[a]	72 (77.4)[a]	59 (55.7)[a]	5 (5.8)	220 (69.6)[a]	199 (85.4)[a]	2,274 (47.2)[a]
Master's degree	2,730 (42.0)	50 (33.3)	85 (16.5)	8 (10.8)	67 (53.6)	14 (15.1)	36 (34.0)	62 (72.1)[a]	81 (25.6)	7 (3.0)	2,320 (48.3)
Doctoral degree	161 (2.5)	4 (2.7)	5 (1)	0	6 (4.8)	3 (3.2)	3 (2.8)	11 (12.8)	7 (2.2)	1 (0.4)	121 (2.5)
Other	180 (2.8)	3 (2.0)	12 (2.3)	13 (17.6)[b]	4 (3.2)	4 (4.3)	8 (7.5)	8 (9.3)	8 (2.5)	26 (11.2)	84 (1.8)
	n										
No. of years since completed dietetic training	6,459	151	512	64	123	93	106	84	316	230	4,781
	n (%)										
0-5	1,903 (29.5)	43 (28.5)	139 (27.1)	20 (31.3)	31 (25.2)	8 (8.6)	35 (33.0)	27 (32.1)	90 (28.9)	47 (20.4)	1,463 (30.6)
6-10	1,534 (23.8)	44 (29.1)	127 (24.8)	14 (21.9)	41 (33.3)	22 (23.7)	18 (17.0)	18 (21.4)	58 (18.4)	43 (18.7)	1,150 (24.1)
11-15	908 (14.1)	20 (13.2)	75 (14.6)	11 (17.2)	28 (22.8)	20 (21.5)	12 (11.3)	15 (17.9)	41 (13.0)	27 (11.7)	659 (13.8)
16-20	258 (5.5)	15 (9.9)	48 (9.4)	2 (3.1)	16 (13.0)	18 (19.4)	15 (14.2)	2 (2.4)	38 (12.0)	28 (12.2)	176 (3.7)
>20	1,755 (27.2)	29 (19.2)	123 (24)	17 (26.6)	7 (5.7)	25 (26.9)	26 (24.5)	22 (26.2)	89 (28.2)	85 (37.0)	1,333 (27.9)
	n										
Area of practice (select all that apply)	6,474	148	513	71	125	93	104	84	316	229	4,789
	n (%)										
Community	1,097 (16.9)	24 (16.2)	56 (10.9)	20 (28.2)	24 (19.2)	11 (11.8)	15 (14.4)	6 (7.1)	23 (7.3)	26 (11.4)	892 (18.6)
Consultation and business practice	711 (11.0)	12 (8.1)	38 (7.4)	13 (18.3)	30 (24.0)	4 (4.3)	5 (4.8)	4 (4.8)	4 (1.3)	63 (27.5)	538 (11.2)
Food service	426 (6.6)	5 (3.4)	16 (3.1)	5 (7.0)	7 (5.6)	0	1 (1.0)	2 (2.4)	5 (1.6)	6 (2.6)	379 (7.9)
Management	519 (8.0)	13 (8.8)	31 (6.0)	5 (7.0)	5 (4.0)	13 (14.0)	14 (13.5)	7 (8.3)	12 (3.8)	23 (10.0)	396 (8.3)
Patient/client related—inpatients	3,144 (48.6)	91 (61.5)	289 (56.3)	39 (54.9)	26 (20.8)	68 (73.1)	58 (55.8)	59 (70.2)	221 (69.9)	163 (71.2)	2,131 (44.5)

(*continued on next page*)

Table 2. Demographic information of participants completing the International Nutrition Care Process and Terminology Implementation Survey 2017 (*continued*)

Demographic information	Total	Australia	Canada	Denmark	Greece	Ireland	New Zealand	Norway	Sweden	Switzerland	United States
						n (%)					
Patient/client related—outpatients	3,015 (46.6)	102 (68.9)	269 (52.4)	22 (31.0)	103 (82.4)	60 (64.5)	68 (65.4)	52 (61.9)	157 (49.7)	144 (62.9)	2038 (42.6)
Patient/client related—total	4,917 (75.9)	130 (87.8)	433 (84.4)	44 (62.0)	107 (85.6)	83 (89.2)	96 (92.3)	69 (82.1)	274 (86.7)	204 (89.1)	3478 (72.6)
Public health	424 (6.5)	3 (2.0)	18 (3.5)	5 (7.0)	10 (8.0)	2 (2.2)	3 (2.9)	4 (4.8)	8 (2.5)	7 (3.1)	364 (7.6)
Research	369 (5.7)	23 (15.5)	26 (5.1)	5 (7.0)	36 (28.8)	12 (12.9)	10 (9.6)	14 (16.7)	12 (3.8)	13 (5.7)	218 (4.6)
Teaching (academic)	542 (8.4)	13 (8.8)	26 (5.1)	9 (12.7)	23 (18.4)	5 (5.4)	12 (11.5)	30 (35.7)	11 (3.5)	27 (11.8)	386 (8.1)
Other	487 (7.5)	9 (6.1)	35 (6.8)	9 (12.7)	7 (5.6)	2 (2.2)	2 (1.9)	11 (13.1)	10 (3.2)	16 (7.0)	386 (8.1)
Not currently working as dietitian	266 (4.1)	2 (1.4)	15 (2.9)	5 (7.0)	7 (5.6)	0	0	1 (1.2)	8 (2.5)	2 (0.9)	226 (4.7)

[a]Entry-level education required for dietetics licensure/registration in each country.
[b]In Denmark, dietitians educated before 2002 did not complete a bachelor's degree education level. Instead they completed a specialized course after basic education in catering managing or home economics.

(process) for more than 1 year, and of these, the majority reported using the NCP between 1 and 5 years (Table 3). For both the process and the terminology, the Nutrition Diagnosis step was reported to have been implemented earlier than the other steps ($P<0.0001$). Of respondents, 64% reported having implemented Nutrition Diagnosis terminology for more than 1 year, whereas 53% to 56% reported having implemented the other steps for more than 1 year. A few respondents reported that they had been previously using the NCPT (terminology) but were no longer using it, whereas no one reported abandoning the NCP (process). With regard to the NCPT (terminology) implementation, approximately 25% of respondents reported that they did not intend to implement the Nutrition Assessment step, Nutrition Intervention step, and Nutrition Monitoring and Evaluation step terminologies. However, a slightly smaller percentage (19%) of respondents reported that they did not intend to implement the Nutrition Diagnosis step terminology.

The linear regression showed that country of residence was a significant factor associated with both NCP (process) and NCPT (terminology) implementation (Table 4). All countries except Australia and New Zealand were associated with a significantly lower level of NCP and NCPT implementation compared with the United States. As an example of the difference between countries, the implementation of the Nutrition Diagnosis terminology is illustrated in Figure 3. Figure 3 shows, for example, that 80% of Australian respondents reported using the NCPT in the Nutrition Diagnosis step frequently or always compared with 17% of Greek respondents. Table 4 shows this association between NCP process and terminology implementation with country of residence, education level, years since dietetics training was completed, and area of practice. Implementation was associated with the years since completed training and area of practice. Education level was not significantly associated with NCP (process) implementation; however, those with a master's degree were greater implementers of the NCPT (terminology).

Area of practice was a significant predictor of NCP and NCPT implementation. Of dietitians who reported working with inpatients, 81%, and 61%, reported frequently or always using the NCP (process) and NCPT (terminology), respectively. Of dietitians working with outpatients, 70% and 44% reported frequently or always using the NCP (process) and NCPT (terminology), respectively. Dietitians working in the public health practice areas reported the lowest implementation: 54% and 28% reported frequently or always using the NCP (process) and NCPT (terminology), respectively.

Fewer years since completion of dietetics education was significantly associated with a higher level of NCP/NCPT implementation. The linear regression showed that for each extra year since completion of education, the reported implementation of both NCP and NCPT was slightly lower. Of dietitians who completed their training after 2011, 81% and 57% reported frequently or always using the NCP (process) and NCPT (terminology), respectively. For dietitians who completed their training before 1998, the percentages who frequently or always reported using the NCP and NCPT were lower (62% for NCP and 45% for NCPT).

DISCUSSION

To our knowledge, this is the largest international survey regarding dietitians' use of standardized working processes

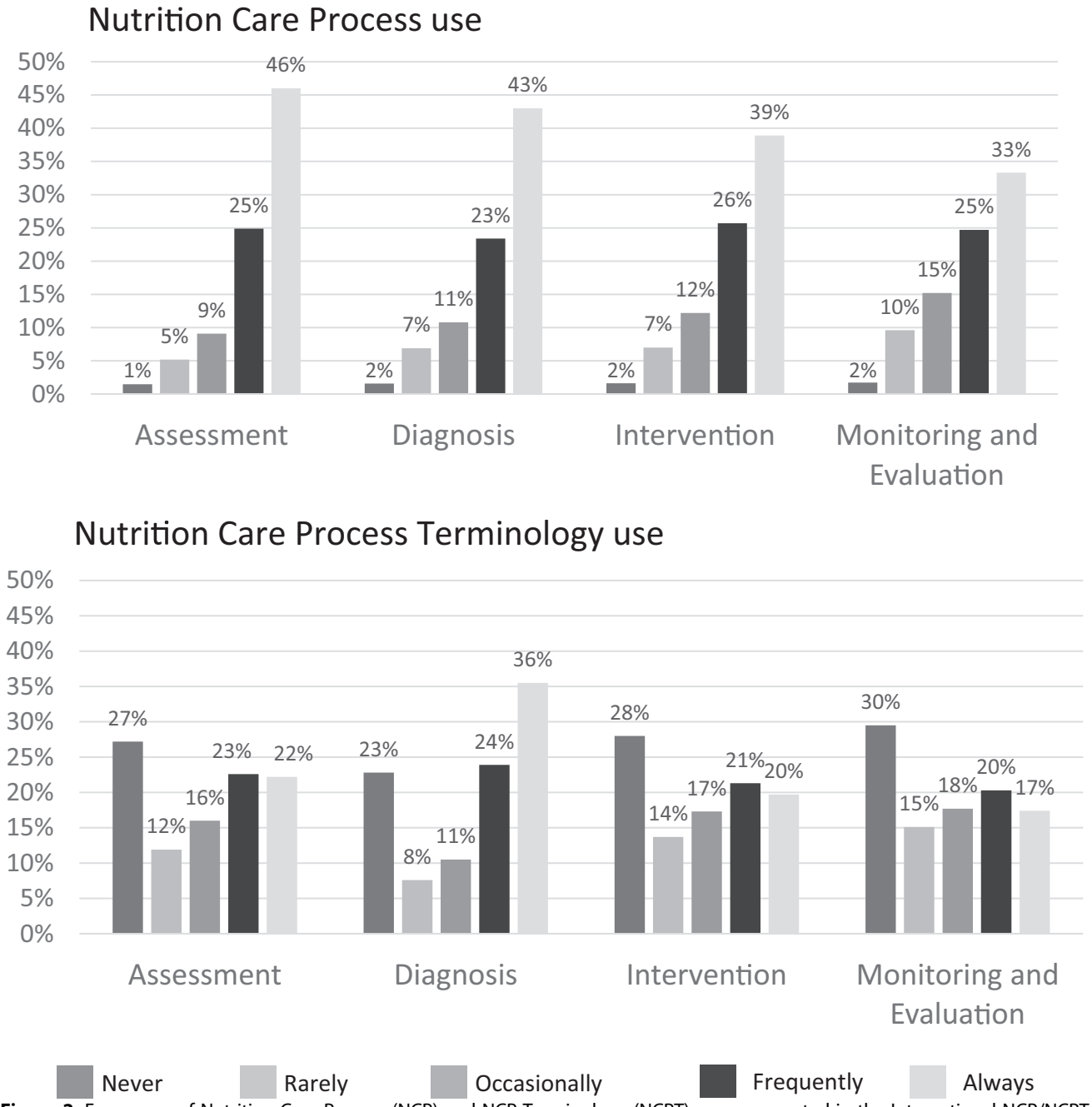

Figure 2. Frequency of Nutrition Care Process (NCP) and NCP Terminology (NCPT) use, as reported in the International NCP/NCPT Implementation Survey 2017, presented by NCP step.

and terminologies. The results of this survey suggest that implementation of NCP (process) is greater than NCPT (terminology). Respondents in all countries reported using or planning to use the NCP (process) to a larger extent and had reported using the NCP (process) longer compared with the NCPT (terminology). Earlier studies have also shown differences in dietitians' attitudes toward the NCP and NCPT. In an Australian survey from 2014, respondents reported seeing the value of NCP (process) more compared to the NCPT (terminology), and they were more confident in implementing the NCP (process) compared with the NCPT (terminology).[8] Although the Academy's first NCP model was presented in 2003, there were previous similar process descriptions that were used that encompassed the same or similar steps in nutrition care.[2] Thus, it might be that dietitians do not perceive the NCP as a very new way of working. On the other hand, a standardized terminology is a rather comprehensive and complex innovation to incorporate into daily routines, and might take longer for dietitians to implement. In addition, already existing electronic health record templates, as well as other organizational aspects such as

Table 3. Responses to questions on the 2017 International Nutrition Care Process (NCP)/NCP Terminology (NCPT) Implementation Survey: "How long have you consciously used the NCP structure?" and "How long have you consciously used the NCPT terminology?"

Item	Do not plan to implement	Intend to implement	<1 y	1-5 y	>5 y	Used before but stopped	*P* value Kruskal-Wallis test
	←——————————————%——————————————→						
NCP							<0.0001[a]
Assessment (n=5,531)	16.7	7.7	9.4	37.6	28.4	0	
Diagnosis (n=5,519)	16.5	7.2	9.1	38.1	29.2	0	
Intervention (n=5,497)	17.1	9.5	9.4	36.7	27.2	0	
Evaluation and Monitoring (n=5,488)	18.1	10.6	9.1	35.8	26.4	0	
NCPT							<0.0001[a]
Assessment (n=5,277)	23.2	12.1	8.2	32.2	24.0	0.2	
Diagnosis (n=5,287)	19.0	8.2	8.6	37.0	27.0	0.3	
Intervention (n=5,250)	23.6	13.7	8.1	31.4	22.9	0.3	
Evaluation and Monitoring (n=5,255)	24.4	14.6	7.9	30.7	22.2	0.2	

[a]In the analyses, all four NCP steps were grouped together for NCP and NCPT, respectively. The groups compared were based on the duration of NCP/NCPT use (Do not plan to implement/Intend to implement/<1 year/1 to 5 years/>5 years/Used before but stopped).

leadership, workplace culture, or economic constrains might affect incorporation of the terminology.[24-26] A further reason for reluctance toward the terminology might be a concern about how well other health care professionals will understand the terminology.

A Swedish focus group study showed that although many dietitians could see advantages with using the NCP process, they were still ambivalent toward the terminology because they found some terms, especially in the environmental–behavioral domain, stilted or even harsh and offensive toward patients. They therefore sometimes avoided using the standardized language.[7] With health care in many countries working toward patients getting increased access to their patient record, this might be an important reason for the difference in use between the NCP process and the NCPT terminology. In the 2016 version of the NCPT, synonyms were included for some terms, allowing for alternate ways of describing nutrition-related conditions in the environmental–behavioral domain (eg, "limited self-monitoring" instead of "self-monitoring deficit").[27] Future evaluations will show whether this change will contribute to increases in NCPT use.

Regarding the terminology, there were also clear differences between the four NCP steps, with the second step, Nutrition Diagnosis, being more implemented compared with the other steps. In NCP/NCPT communication by national and international organizations as well as researchers, there has been a great focus on Nutrition Diagnosis, which has been presented as "the missing step."[28-32] In the Swedish focus group study described earlier, it was clear that many dietitians associated NCPT with mainly the standardized Nutrition Diagnosis.[7,24] Ireland is an interesting exception in the present study because respondents from this country report having implemented Nutrition Assessment terminology to a larger extent compared with the Nutrition Diagnosis terminology. This most likely reflects the Irish NCP/NCPT implementation strategy, where a standardized Nutrition Assessment structure, involving a standardized sequence of Nutrition Assessment heading terms, was implemented via educational sessions as a first phase in the NCP/NCPT implementation in Ireland (personal communication with Orla Haughey, RD, November 17, 2017).[33]

The geographic differences we observed in implementation level may be related to the time that implementation began in the different locations. For example, countries reporting the highest implementation level (Australia, United States, and New Zealand) have utilized NCP/NCPT longer (ie, introduction in 2011 or earlier), whereas countries introducing NCP/NCPT at a later point in time show lower implementation levels. In Canada and Denmark, NCP/NCPT was introduced already in 2006 (Canada) and 2003 (Denmark), but in this study these countries were found to have moderate implementation levels compared with the other countries. However, neither Canada nor Denmark had a national implementation strategy when implementation started, with early NCP/NCPT introduction only being associated with certain regions or individuals. Several implementation studies show that a successful incorporation of innovations depends on an overall strategy and a conscious focus on implementation.[34-36] To reach a high implementation level, the innovation thus needs to be anchored in the larger organization rather than depending on a few single enthusiasts. Greece reported the lowest NCP/NCPT implementation level, reflecting that NCP/NCPT has not yet been formally introduced to Greek dietitians.

The association between NCP/NCPT implementation and area of practice is also of interest because this may indicate in which practice areas NCP/NCPT is currently found to be the most useful. It is not surprising that clinical dietitians seem to use

Table 4. Associations among Nutrition Care Process (NCP) and Terminology (NCPT) implementation and country of residence, education level, years since completed training, and area of practice, as identified in the International NCP/NCPT Implementation Survey 2017

	NCP Implementation Score (Max Score 20[a])[b]				NCPT Implementation Score (Max Score 20[a])[c]			
	Unstandardized Coefficient				Unstandardized Coefficient			
	β±standard error	Standardized β	*t* test	*P* value	β±standard error	Standardized β	*t* test	*P* value
Constant	13.935±.200		69.742	<0.0001*	11.294±.216		52.402	<0.0001*
Country[d]								
United States (reference country)								
Australia	.598±.434	.017	1.380	0.168	−.236±.467	−.006	−.505	0.614
New Zealand	.589±.501	.014	1.175	0.240	−1.688±.527	−.041	−3.204	0.001*
Canada	−1.062±.252	−.053	−4.208	<0.0001*	−.950±.273	−.046	−3.485	<0.0001*
Switzerland	−2.071±.362	−.073	−5.726	<0.0001*	−1.849±.388	−.063	−4.764	<0.0001*
Denmark	−2.343±.709	−.041	−3.305	0.001*	−2.677±.732	−.047	−3.659	<0.0001*
Sweden	−2.439±.307	−.100	−7.945	<0.0001*	−3.344±.337	−.129	−9.924	<0.0001*
Norway	−5.075±.590	−.107	−8.608	<0.0001*	−5.965±.641	−.120	−9.300	<0.0001*
Ireland	−5.443±.551	−.122	−9.877	<0.0001*	−5.711±.593	−.124	−9.628	<0.0001*
Greece	−6.563±.520	−.158	−12.627	<0.0001*	−5.294±.557	−.123	−9.495	<0.0001*
Other	−.737±.976	−.009	−.755	0.450	−.091±1.089	−.001	−.083	0.934
Level of education in nutrition/dietetics[d]								
Bachelor's degree/ graduate diploma (reference level)								
Master's degree	.263±.145	.024	1.813	0.070	.322±.156	.028	2.065	0.039*
Doctoral degree	.018±.474	.001	.038	0.970	.501±.507	.014	.988	0.323
Other	.564±.425	.017	1.328	0.184	.399±.452	.011	.883	0.377
No. of years since completed dietetics training[d]								
For every additional year since completed training	−.062±.006	−.137	−10.847	<0.0001*	−.035±.006	−.075	−5.786	<0.0001*
Area of practice[e]								
Patient/client related—inpatients	2.867±.152	.265	18.898	<0.0001*	3.043±.164	.271	18.609	<0.0001*
Patient/client related—outpatients	1.335±.145	.123	9.237	<0.0001*	1.034±.156	.092	6.637	<0.0001*
Management	1.094±.253	.055	4.323	<0.0001*	1.212±.273	.059	4.448	<0.0001*
Teaching—academic	.801±.254	.042	3.158	0.002*	.292±.272	.015	1.075	0.282
Community	−.072±.186	−.005	−.388	0.698	−.323±.199	−.022	−1.621	0.105
Research	−.216±.311	−.009	−.697	0.486	−.028±.333	−.001	−.083	0.934
Consultation and business practice	−.250±.218	−.014	−1.149	0.251	−.631±.233	−.035	−2.708	0.007*
Foodservice	−1.308±.287	−.059	−4.560	<0.0001*	−.876±.308	−.038	−2.845	0.004*

(*continued on next page*)

Table 4. Associations among Nutrition Care Process (NCP) and Terminology (NCPT) implementation and country of residence, education level, years since completed training, and area of practice, as identified in the International NCP/NCPT Implementation Survey 2017 (*continued*)

	NCP Implementation Score (Max Score 20[a])[b]				NCPT Implementation Score (Max Score 20[a])[c]			
	Unstandardized Coefficient				Unstandardized Coefficient			
	β±standard error	Standardized β	*t* test	*P* value	β±standard error	Standardized β	*t* test	*P* value
Public health	−1.610±.283	−.074	−5.700	<0.0001*	−1.953±.307	−.085	−6.369	<0.0001*
Not currently working as dietitian	−.921±.390	−.031	−2.359	0.018*	−.329±.426	−.010	−.773	0.440
Other	−.407±.262	−.020	−1.550	0.121	−.916±.286	−.042	−3.201	0.001*

[a]For each of the four NCP steps (Nutrition Assessment, Nutrition Diagnosis, Nutrition Intervention, Nutrition Monitoring, and Evaluation), participants indicated an implementation level from 0 to 5. The implementation levels for all NCP steps were summarized, resulting in a maximum total score of 20. Thus, participants with 0 points stated never using any of the NCP steps, whereas participants with 20 points stated always using all four NCP steps.

[b]R^2 for this model is 0.170.

[c]R^2 for this model is 0.151.

[d]Negative numbers indicate lower mean score compared to the reference category, whereas positive numbers indicate higher mean score compared with the reference category. The following examples show how these parts of the table should be interpreted. For participants from Canada, mean score is 1.062 lower compared with the reference category, which is participants from the United States. For participants from Ireland, mean score is 5.443 lower compared with the United States.

[e]Multiple responses were allowed for area of practice. The following two examples show how this part of the table should be interpreted. For participants working in patient-related work (inpatients), mean score is 2.867 higher compared with participants not working in this area of practice. For participants working in public health, mean score is 1.610 points lower compared with participants not working in this area of practice.

*Statistically significant difference with $P<0.05$.

NCP/NCPT more compared with dietitians practicing in other areas because the communication of both the process and terminology often is very focused on clinical practice. For example, education sessions are often built on patient cases, and implementation narratives and studies that are presented often concern hospitals or primary care centers.[9,24,30,37-41] Communication regarding NCP/NCPT in community care, foodservice management, or research has been more limited.[42,43] Dietitians working in public health reported the lowest use of both the NCP and NCPT, which might indicate that the process and terminology do not meet their needs. This may be due to the traditional implementation approach of NCP/NCPT involving a focus on the individual in the clinical setting, whereas public health dietitians focus on public health strategies on a larger scale and on population level. In the 2017 electronic NCPT edition, a new domain for Population Based Nutrition Action has been added for Nutrition Interventions, including a focus on the Social Ecological Model.[20,44-46]

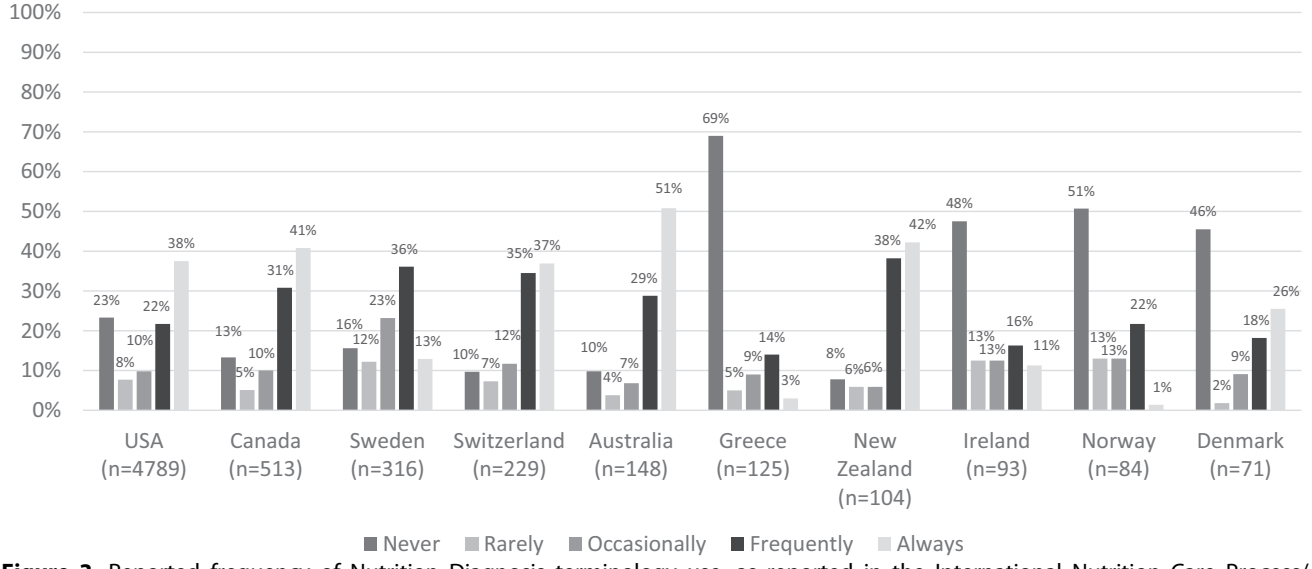

Figure 3. Reported frequency of Nutrition Diagnosis terminology use, as reported in the International Nutrition Care Process/Nutrition Care Process Terminology Implementation Survey 2017, presented by country.

Recently, the NCP model has been revised to allow for more population-focused nutrition care, and new terminology is further being developed for all steps in the model.[47] This increased focus of the NCP and NCPT on dietetics work at a population level might appeal to dietitians working in public health. Future evaluations of public health dietitians' NCP/NCPT use may show whether these additions in NCP terminology and content will affect the use of a standardized dietetics terminology in public health. Another aspect that might increase NCP/NCPT use among other areas of practice beyond clinical-related work, is the development of the Academy Health Informatics Infrastructure, which enables dietitians in different areas of practice to collect and register outcomes data related to nutrition care using the NCP and NCPT.[48] Currently, universities in Australia, Canada, the United States, and New Zealand are exploring or using Academy Health Informatics Infrastructure to instruct students (personal communication with Alison Steiber, PhD, RD, September 3, 2017, and Lyn Lloyd, RD, October 31, 2017). The use of this tool in dietetics education and practice might result in an increased awareness and familiarity with both NCP process and terminology among the future generations of dietitians in all areas of practice.

The results showed that dietitians who completed their dietetic education more recently reported a higher level of NCP/NCPT implementation compared with those who reported completing their education earlier. A probable reason for this is the incorporation of NCP/NCPT in the higher education institutions' educational curriculum during recent years. As seen in Table 1, all countries but Greece today include NCP/NCPT in their dietetics education curriculum. Level of education did not seem to be associated with NCP (process) implementation; however, dietitians with a master's degree did report a higher degree of implementation of the terminology (ie, the NCPT) compared with those with lower education levels. The reasons for this have not been explored in this study. A confounding aspect is the fact that master's degrees may have become more common among dietitians during recent years. In addition, dietitians completing their education more recently also tend to have a higher level of education compared with dietitians who completed their education earlier. Because dietitians completing their education more recently are more likely to use the NCP/NCPT, this makes it difficult to draw any further conclusion about the association between education level and NCP/NCPT use. However, it is likely that dietitians with a master's degree more greatly appreciate benefits of a standardized terminology related to perspectives and insights gained during their master's degree training. These perspectives can, for example, be the importance of evaluation of outcomes connected to research and evidence-based practice. We suggest that future research address the details of this finding.

A strength of this study is the thoroughly tested survey that was used and completed by dietitians from many countries. Strengths and limitations of the INIS tool have been discussed elsewhere.[17] The use of a web-based survey enabled ease of dissemination, although a potential risk was that those other than the intended recipients could have responded to the survey. To help prevent this, the survey link was disseminated through targeted communication channels, including professional association e-mail lists and social media groups for dietitians. The survey included questions enabling the exclusion of respondents who did not report being registered dietitians (or equivalent) or having completed training to be registered dietitians.

The low response rate in some countries might be of concern because the study aimed to include an as large of a sample as possible in all the included countries. However, based on the demographic information comparison, the responses were still considered roughly representative of the intended populations. It was apparent that in the smaller countries such as Norway, New Zealand, and Sweden, response rates were proportionally higher than in the larger countries such as the United States, Australia, and Canada. One reason might be that dietitians from larger countries may receive more survey invitations compared with dietitians from smaller countries. A larger dietetics profession naturally leads to more activities in the national association and other professional networks, which also increases the need among dietitians to decline some of these invitations. Another reason for the difference in response rates between countries might be that it is easier to keep an overview of the dietetics profession in smaller countries where the total numbers of dietitians are smaller and hence easier to reach. A consequence of the low response rate is the need to interpret the survey results with caution.

The invitation to the survey included information about the study's purpose, which was to explore use of the NCP by dietitians. It is logical that dietitians familiar with the NCP/NCPT were more likely to accept this invitation compared with those who are not. In addition, even in the case that the respondents familiar with the NCP, it is still more likely that NCP users would have accepted the invitation compared with nonusers. This might have biased the results both regarding to the reported awareness of the NCP and the use of the process and terminology. Thus, actual numbers regarding NCP/NCPT awareness and implementation might be lower than indicated in this study, although the bias is likely to be similar across countries.

An approach for future surveys might be to aim for a smaller sample of dietitians, specifically selected to represent the larger population of dietitians. This would allow for more targeted survey dissemination and might give results that are more generalizable. Special efforts could also be made to encourage dietitians not familiar with the NCP/NCPT to participate in the study.

CONCLUSIONS

This article compared NCP/NCPT implementation across 10 countries, examining associations between level of implementation and demographic factors. The results from the linear regression model (coefficient of determination, R^2=0.151 and 0.170), indicate that demographic factors might explain parts of the differences in implementation, but there are also other factors influencing NCP/NCPT implementation. As earlier research has shown, these factors might be individual or organizational.[24,25,49] In future evaluation of NCP/NCPT implementation initiatives, such aspects should be included. NCP/NCPT influences should also be evaluated qualitatively, focusing on the broader implications across health care settings, in interprofessional teamwork, and in communication with patients.

This has been the first multinational collaboration studying NCP/NCPT implementation in several countries across the

world. Still, one concern might be that mainly countries listed as high income according to the World Bank participated in the study.[50] Inclusion of countries with other prerequisites would likely reveal new challenges and perspectives on NCP/NCPT implementation.[51] Therefore, a recommendation for future studies is to make an effort to recruit participants from other parts of the world to identify the support needed for lower income countries regarding standardized processes and terminologies for dietetics practice. The modular structure of the INIS tool would also allow for possible addition of new modules adapted for the specific needs of dietitians in low-income countries, which could be helpful in future studies.[18]

In this study, countries with more NCP/NCPT implementation experience and with a clear implementation strategy were associated with a higher level of implementation compared with other countries. Another key difference is the inclusion of NCP/NCPT in dietetics education. The international development and implementation of NCP/NCPT is a large and multifaceted process. Within this process, it is necessary to recognize country differences and specific needs, associated not only with geographic location, but also factors such as area of practice or the number of years in the profession. This study helps to illustrate some of these aspects, along with the need to clarify and promote the value of a standardized dietetics language together with the more easily implemented process, the need to adjust and promote NCP/NCPT for use in other areas of practice outside of clinical related work, and the need for strategic plans to achieve a successful NCP/NCPT implementation among dietitians.

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STATEMENT OF POTENTIAL CONFLICT OF INTEREST

No potential conflict of interest was reported by the authors.

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AUTHOR CONTRIBUTIONS

Y. Orrevall, E. Lövestam, A. Steiber, and A. Vivanti participated in initial discussions and planning of the study; all other authors participated in the design of the project by critical revisions of the initial plans. E. Lövestam coordinated the international data collection in collaboration with Y. Orrevall; all other authors were involved in local data collection. E. Lövestam was responsible for data analysis and interpretation and drafted the manuscript; Y. Orrevall participated in data interpretation and provided critical revision of the manuscript; and all other authors provided critical revision on data analysis, interpretation, and manuscript development. All consortium members assisted in research planning or data collection. All authors and consortium members read and approved the final version of the manuscript.