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# Quantifying the Medical Home Concept

Excerpt from

## Measuring Medical Home: A Resource Manual for Researchers and Analysts

<http://medicalhomedata.org/ViewDocument.aspx?item=436>



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### III. QUANTIFYING THE MEDICAL HOME CONCEPT

Adequately measuring whether and to what extent children have a medical home involves capturing the relationships within and across various components and characteristics of this complex concept. Such an endeavor presents a unique set of analytic challenges which are further compounded by the opportunities and constraints characteristic of survey data in general, and the NS-CSHCN and NSCH in particular.

#### *3.1 General analytic considerations*

**Data availability:** The type and content of available data elements influence the construction and interpretation of any medical home composite measure that might be computed. Feasibility and methodological constraints often limit the number and type of questions included in a survey. Under ideal circumstances, survey researchers would field a lengthy, comprehensive set of questions which attempt to operationalize the AAP definition in great detail. In practice, survey administration costs, time limits, and respondent burden oblige survey designers to address the most policy relevant concepts or those with the strongest evidence base. In the NS-CSHCN and NSCH, only a subset of the characteristics or topics specified under each component of the AAP medical home definition are addressed. As described in Table 3, neither the NS-CSHCN nor NSCH surveys include questions about the physical and financial accessibility component of AAP medical home definition. The characteristics of compassionate care are measured indirectly through the questions used to address topics within of the Family-centered definitional component.

Another common reason for gaps in survey content is a lack of reliable methods for measuring particular concepts. For example, the continuity of care component of the AAP medical home definition is not amenable to assessment using cross-sectional, point in time surveys. Neither survey asks if the child has a care plan in place or whether the child's doctors and other providers maintain a centralized electronic record with all pertinent medical information – both of which are identified by the AAP definition as characteristics of care within the Coordinated Care component. While relevant to the effective delivery of care coordination, reliable methods for eliciting parental report on these topics are not currently available. Additional development work is needed before these and other characteristics of the medical home model are able to be reliably assessed in the context of parent respondent surveys.

**Identifying valid denominators:** The vast majority of children seldom, if ever, require services beyond basic preventive and acute care. It is a different story for children with special health care needs who experience chronic health conditions for which they require above routine health care and related services. The scope and intensity of health care services required by this group far exceeds that for children in general. At the survey measurement level, the differential need for services within the child population makes it necessary to employ filter questions and skip patterns to identify children who actually need or experience the various types of care so that respondents can legitimately answer the questions asked. For this reason, developing a composite measure of medical home from such data requires methods that distinguish, at both the data collection and analytic levels, children who do and do not need the specific types of care being assessed in order to specify valid denominators for measurement.

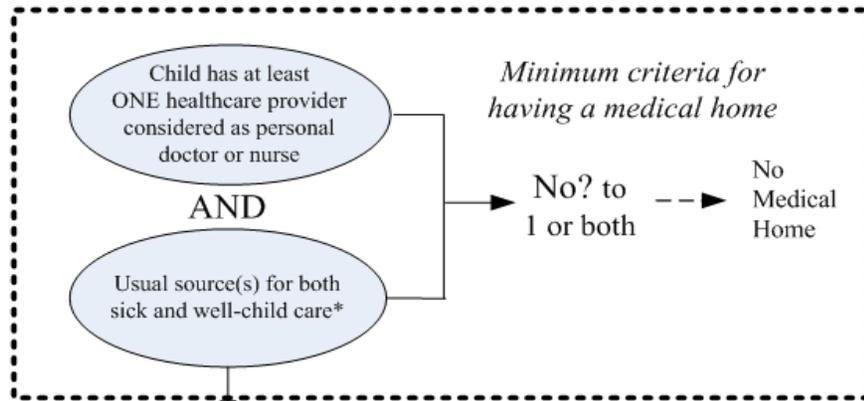
**Minimum criteria for having a medical home:** As described earlier, the NS-CHSCN and the 2007 NSCH assess medical home from the perspective of a network of services and care delivered by multiple providers across a variety of settings, whereas the 2003 NSCH anchors all of its medical home questions to care received from or managed by the child's personal doctor or nurse. These two perspectives on the medical home have been debated in the field, and the evolution of thinking spurred by that debate is reflected in the revisions to questions and approaches used in each subsequent survey. Although both starting point perspectives are reasonable, each translates into conceptual differences regarding the baseline criteria used to develop a composite score for care reflecting the spirit of the medical home model.

The NS-CSHCN and 2007 NSCH baseline medical home criteria call for children to have at least one personal doctor/nurse AND usual sources for health care. In contrast, 2003 NSCH minimum medical home criteria require children to have a personal doctor or nurse who also consistently communicates well AND at least one preventive medical care visit in the past 12 months. Figure 1 illustrates the different criteria for having a medical home used by each survey.

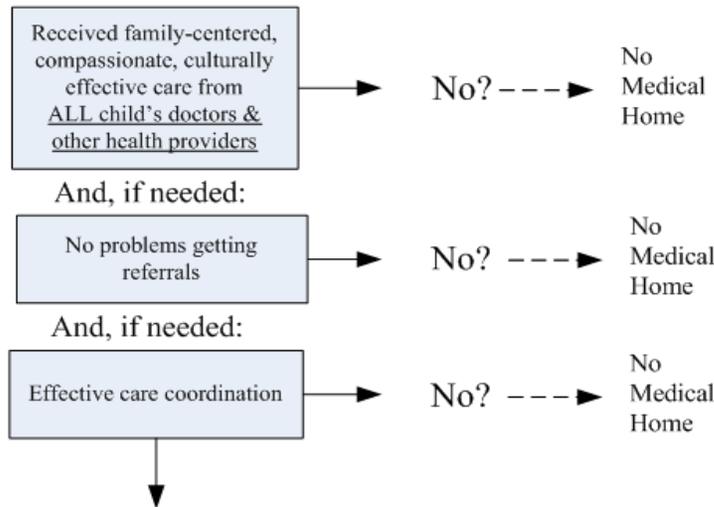
**Figure 1: Medical Home Measurement using the National Child Health Surveys**

2001 NS-CSHCN; 2005/06 NS-CSHCN; 2007 NSCH

Assessment focus: Care from network of health care providers and settings with which child and family interact



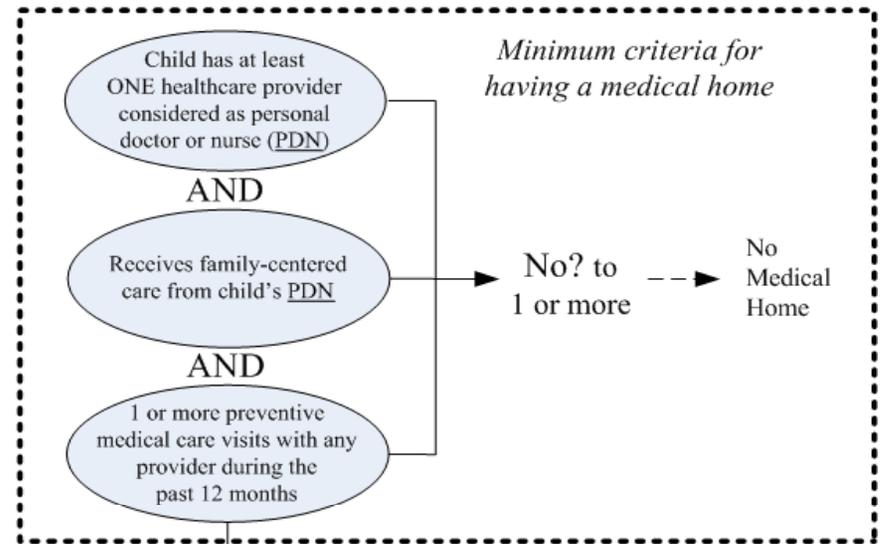
And, if child either had 1 or more doctor visits (NS-CSHCN) or used any of 5 different services (2007 NSCH) in past 12 months:



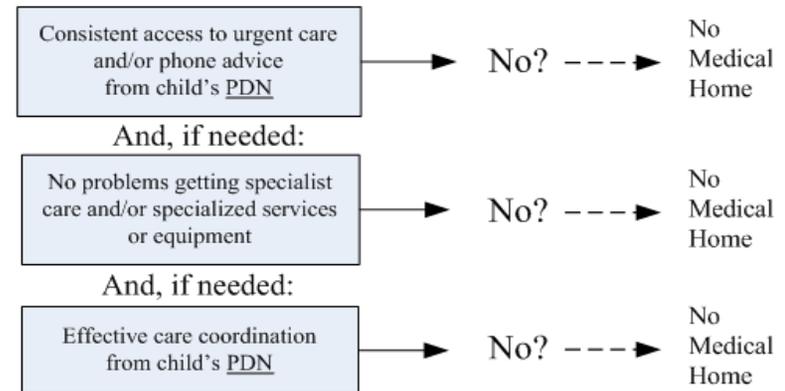
Yes, has a Medical Home

2003 NSCH

Assessment focus: Care from child's primary health care provider



And, if needed:



Yes, has a Medical Home

\* The 2007 NSCH asks a single question about usual source of care when child is sick or advice is needed about his/her health. The NS-CSHCN separates the concepts of sick care and for well child care into two different questions.

### **3.2 Overview of the “On Every” Scoring Approach**

Given the general analytic considerations discussed above, members of the survey design team for the NS-CSHCN and NSCH considered several approaches for summarizing the data elements in the two surveys into overall composite measures of the medical home concept. Previous research using other surveys identified several options for creating medical home scores from parent-reported data.<sup>3</sup> One of these options, termed the “on every” method, was selected by MCHB for use with the NS-CSHCN and NSCH medical home data.

The “on every” method uses the results from the various sub-component topics assessed within the components of the AAP medical home definition to construct an overall composite measure. Some of the sub-component topics do not apply to all children. For example, not all children need referrals in order to see other doctors or obtain services so it does not make sense to ask the parents of these children whether problems occurred in getting referrals. In such cases, question responses are used to identify children who did not need a specific type of care and thus there is a legitimate reason for their parents not being asked about that topic. To qualify as having a medical home, a child must either receive care that meets the threshold criteria or qualify as not needing such care on EVERY sub-component topic assessed. Constructing the overall composite measure using the “on every” method entails the following steps:

- STEP 1: From the set of questions pertaining to a specific sub-component topic, identify the children who needed care and those who are legitimate skips because care was not needed.
- STEP 2: Identify responses meeting threshold criteria for care according to the specific scoring parameters for each sub-component topic. Depending upon the number of questions involved, this step may include developing several interim variables to be further aggregated in Step 3.
- STEP 3: Use the results from Step 2 to create a summary variable for each sub-component topic by categorizing children into one of 3 mutually exclusive groups:
  - a) Care meets the threshold criteria for sub-component topic
  - b) Care does not meet the threshold criteria for sub-component topic
  - c) Legitimate skip because child did not need the type of care addressed by sub-component topic during the time frame being assessed
- STEP 4: Use results from Step 3 to construct the overall composite measure of medical home. To be classified as having a medical home according to the “on every” method, a child must meet the threshold criteria or qualify as not needing care (legitimate skip) on EVERY sub-component topic assessed by the survey.

For example, suppose a child qualifies as needing care covered by three of five different sub-components topics assessed in a particular survey. In order to classify as having a medical home, the child's care must meet the threshold criteria for every one of these three sub-components topics PLUS have responses indicating that he or she did not need the types of care addressed by the remaining two sub-components topics. It is important to note that the medical home concepts measured in the NS-CSHCN and NSCH represent the minimal criteria for having a medical home. In addition, consumer surveys tend to yield optimistic reports of experiences of care on survey items such as those used to assess medical home in the NS-CSHCN and NSCH. These two issue (minimum set asked and positivity bias of surveys) supported the use of an "on every" scoring approach.

**Survey specific considerations:** The "on every" approach is used to construct the overall medical home composite measures derived from both the NS-CSHCN and the NSCH surveys. The parameters used to develop the sub-component topic scores, however, are specific to each survey because of differences in the structure of the data elements, types of questions, and number of sub-component topics. Sections 3.3 through 3.5 describe the sub-component topic scoring parameters for each of the surveys. These sections also include examples based on six hypothetical cases illustrating how the "on-every" scoring algorithm is applied to different patterns of sub-component topic results from each survey to create the overall medical home composite measures.

### ***3.3 Medical home measurement using NS-CSHCN data elements***

The overall medical home measure from the NS-CSHCN is a composite of five different sub-component topics assessing the following:

1. Child has at least one personal doctor or nurse
2. Family-centered care
3. Getting needed referrals
4. Usual source(s) for both sick and well care
5. Effective care coordination

Table 5 organizes the five medical home topics assessed by the NS-CSHCN according to the specific definitional components of the AAP medical home model each is designed to measure. The number of NS-CSHCN survey items used to derive each of the sub-component topic variables varies from one to seven (see Table 2). In the 2001 survey, a total of 17 questions are used to develop the medical home composite measure. Subsequent revisions led to a total of 21 items from the 2005/06 NS-CSHCN used in measuring the medical home concept.

***Sub-component topic denominators:*** Two of the NS-CSHCN sub-component topics are relevant for all children in the sample; the content of the remaining topics pertain only to the children who needed the type of care being addressed. Children with survey responses indicating a specific type of care was not needed are designated as “legitimate skips” because their parents cannot legitimately answer questions about care their children did not receive. The relevant subsets of children (i.e., denominators) for the five sub-component topics assessed in the NS-CSHCN are as follows:

1. Two sub-component topics (*Have at least one personal doctor or nurse; Usual sources for both sick and well care*) include all children in the sample.
2. One sub-component topic (*Family-centered care*) includes only those children with one or more doctor visits during the past 12 months. All other children are considered “legitimate skips” for scoring purposes.
3. Two sub-component topics (*No problems obtaining referrals; Effective care coordination*) pertain only to children who needed these types of services during the past 12 months. Children with survey responses indicating the relevant services were not needed or (as in the case of the care coordination questions for the 2005/06 survey) not used by the child are considered “legitimate skips” for scoring purposes.

**Sub-component topic thresholds and legitimate skips:** Table 5 summarizes the threshold and legitimate skip criteria for each of the NS-CSHCN sub-component topics. The SAS and SPSS scoring programs provided in Appendices A\_1 through B\_2 create the five derived variables listed in the second column of the table – one for each of the sub-component topics used to construct a medical home composite measure from the NS-CSHCN data elements.

**Table 5:** Measuring Medical Home using NS-CSHCN data elements: Sub-component topic variables

<i>Sub-component topics measured within each AAP Medical Home definitional component</i>	<b>Variable name*</b>	<b>Threshold criteria</b>	<b>Legitimate skip criteria</b>
<b>RELATIONSHIP WITH SPECIFIC PROVIDER</b>			
1. Has at least one “personal doctor or nurse”	PERSDOC	“Yes” to question about having a personal doctor or nurse	No skips; asked for all sample children
<b>ACCESSIBLE</b>			
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<b>FAMILY-CENTERED</b>			
2. Receives family-centered care	FAMCENT	Responses of “Usually or Always” to all questions assessing family-centered and culturally effective care	Responses indicating child did not visit a doctor during past 12 months
<b>CONTINUOUS</b>			
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<b>COMPREHENSIVE</b>			
3. Getting needed referrals	NOREFPRB	“No problem” response to question about obtaining needed referrals	Responses indicating child did not need referrals (2005/06) or did not need specialist care (2001) during past 12 months
4. Usual source(s) for both sick and well care	USUALSW	Responses indicating child has regular sources of care other than hospital emergency room for both sick and well care	No skips; asked for all sample children
<b>COORDINATED</b>			
5. Getting effective care coordination when needed	CARECOOR	Responses indicating getting all desired help with care coordination, and if needed, responses of “Very satisfied” (2005/06) or “Excellent” (2001) to questions about providers’ communication with each other and with school/other programs.	Responses indicating no need for professional help with care coordination (2001) In 2005/06, the care coordination questions are only asked for children who used 2 or more services during the past year. Children who used less than 2 services and those whose family members do not report getting or wanting extra help to coordinate child’s care are considered legitimate skips.
<b>COMPASSIONATE</b>		<i>Assessed by questions within the Family-centered Care component</i>	
<b>CULTURALLY EFFECTIVE</b>		<i>Responses to questions addressing culturally effective care included in the Family-centered Care sub-component topic scoring</i>	

-- Not assessed by survey (See Table 2 for details) \*2005/06 SAS variable names shown in the table; see Appendices for SPSS variable names

**Scoring sub-component topics:** As discussed in previous sections, a number of changes and additions were made to the medical home questions used for the 2005/06 NS-CSHCN. Some of these changes resulted in significant revisions in the threshold criteria and valid denominators for the sub-component topics – especially those addressing getting needed referrals and effective care coordination. The scoring parameters for the 2001 and 2005/06 versions of the sub-component topics described earlier in Table 5 are briefly outlined below – including any implications associated with revisions to the medical home questions used in the 2005/06 NS-CSHCN:

1. Child has at least one personal doctor or nurse
  - a. Constructed from a single item
  - b. *Threshold criteria* = YES responses indicating child has one or more than one personal doctor or nurse
  - c. Minor wording changes in 2005/06 resulted in an additional response option for children with 2 or more personal doctors or nurses; no changes to scoring
  
2. Receives family-centered care
  - a. Constructed from five items in 2001; seven items in 2005/06
  - b. In 2005/06, two new questions about access to interpreter services, when needed, during child’s health care visits were added and incorporated into the family-centered care topic score ; the new questions are only asked for children living in households with primary languages other than English
  - c. Wording of the five family-centered care questions remained the same across survey years; no changes
  - d. *2001 threshold criteria* = responses indicating child had 1 or more doctor visits during past 12 months AND responses of USUALLY or ALWAYS to all five family-centered care questions
  - e. *2005/06 threshold criteria* = responses indicating child had 1 or more doctor visits during past 12 months AND responses of USUALLY or ALWAYS to all five family-centered care questions, AND if needed, responses of USUALLY or ALWAYS to accessing interpreter services during child’s health care visits
  
3. No problems obtaining referrals
  - a. Constructed from 2 items
  - b. Significant changes in question wording and methods in 2005/06
  - c. *2001 threshold criteria* = YES response to child needing care from a specialist doctor during past 12 months AND response of NOT A PROBLEM to obtaining a referral to see a specialist

- d. *2005/06 threshold criteria* = YES response to referrals are necessary in order for child to see other doctors or receive services AND response of NOT A PROBLEM to getting the needed referrals
  - e. IMPORTANT NOTE: In 2001 the valid denominator for “no problems obtaining referrals” sub-component topic are children who needed to see a specialist during the past 12 months (about 50% of CSHCN); in 2005/06 the valid denominator for the sub-component topic changed to children who need to obtain a referral in order to see other doctors or receive services (about 33% of CSHCN).
4. Usual source(s) for both sick and well care
- a. Constructed from four items in 2001; five items in 2005/06
  - b. Minor changes in wording and skip patterns in 2005/06 survey to improve question flow; no changes in scoring
  - c. *Threshold criteria* = responses across the relevant questions indicating child has regular sources other than hospital emergency room for both sick and well care
5. Receives effective care coordination
- a. Constructed from five items in 2001; six items in 2005/06
  - b. Significant changes to question wording and methods in 2005/06
  - c. *2001 threshold criteria* = YES responses to needed AND received professional help with care coordination during past 12 months, AND if needed, responses indicating EXCELLENT communication between child’s doctors and/or between child’s doctors and school or other programs.
  - d. *2005/06 threshold criteria* = If child used 2 or more services during past year, affirmative responses indicating (a) family currently receives help coordinating child’s care and does not need extra help, OR if extra help was needed, family USUALLY received the help desired; OR (b) no help coordinating care was reported AND no wanted extra help coordinating care was reported; AND (c) if child used any of five different specialized services and communication between doctors was needed, responses of VERY SATISFIED with that communication, AND (d) if needed, responses of VERY SATISFIED with communication between doctors and child’s school or other programs.
  - e. IMPORTANT NOTE: In 2001, the valid denominator for the care coordination sub-component topic are children whose family members needed professional help with care coordination during the past year (about 12% of CSHCN met the 2001 inclusion criteria)
  - f. IMPORTANT NOTE: In 2005/06, valid denominator for the care coordination topic changed to children who used two or more of the services asked about in the NS-CSHCN during past year.

Additional information such as the survey-specific item numbers, exact text of the medical home questions, and details of the interim variables developed to construct each sub-component topic

score is included with the user resources for the NS-CSHCN provided in Appendices A\_1 through B\_2.

**NS-CSHCN medical home composite measure:** The SPSS and SAS scoring programs in Appendices A\_1 through B\_2 use the ‘on every’ method (see section 3.2) to construct dichotomous composite measures that classify children as either having or not having a medical home. To qualify as having a medical home as measured in the NS-CSHCN, children must:

- A) Meet both NS-CSHCN baseline criteria for having a medical home (Fig. 1)
- B) AND, either receive care meeting the threshold criteria or qualify as a legitimate skip on each of the three additional sub-components topics.

Figure 2 below presents six hypothetical cases – each illustrating how different combinations of sub-component topic results culminate in the final medical home outcome using the “on every” approach to construct the composite measure. For brevity, the variable names shown in Table 5 are used in Figure 2 to denote each of the five sub-component topics. The details of these derived variables are described in Table 5 and in Appendices A\_1 through B\_2.

**Figure 2: National Survey of CSHCN, 2001 and 2005/06**

Scoring algorithm examples for the NS-CSHCN Medical Home composite measure

		<i>Does child meet threshold criteria?</i>					
<i>Derived variable names for the NS-CSHCN sub-component topics (see Table 5)</i>		Child #1	Child #2	Child #3	Child #4	Child #5	Child #6
<b>“Baseline criteria for having a medical home”</b>	<b>PERSDOC</b>	Yes~	Yes	Yes	No	Yes	Yes
	<b>USUALSW</b>	Yes	Yes	Yes	Yes	Yes	Yes
	<b>FAMCENT</b>	Yes	Yes	X	Yes	Yes	--
	<b>NOREFPRB</b>	Yes	X	X	Yes	No	Yes
	<b>CARECOOR</b>	Yes	X	X	Yes	Yes	Yes
<b>Qualifies as having a Medical Home?</b>		<b>YES</b>	<b>YES</b>	<b>YES</b>	<b>NO</b>	<b>NO</b>	<b>--*</b>

X = Legitimate skip – child did not need the type of care addressed by this topic

-- = System missing or “Don’t know/Refused” responses to 1 or more questions used to derive the sub-component topic variable

\* = Children with missing or “Don’t know/Refused” responses for 1 or more sub-component topics variables are NOT included in the valid denominator when calculating the overall medical home composite score

As illustrated in Figure 2, the minimum NS-CSHCN criteria for having a medical home requires children to have a personal doctor/nurse AND usual sources for both sick and preventive care. In addition to meeting these baseline criteria, children also must receive care meeting the threshold criteria OR qualify as a “legitimate skip” on each of three additional sub-components topics measured in the survey (Figure 2, child #1 through child #3). Failing to meet even one of two baseline criterion automatically categorizes a child as not having a medical home, regardless of whether he or she receives care meeting the thresholds for all other sub-component topics (Figure 2, child #4). On the other hand, children meeting the two baseline criterion qualify as having a medical home, even if they did not need any of the other types of care assessed by the three remaining sub-component topics (Figure 2, child #3).

Conversely, if a child meets the baseline criteria for having a medical home and received care that did not meet the threshold for one or more sub-component topics, the result is “no medical home” (Figure 2, child #5). Finally, the NS-CSHCN medical home scoring programs provided in the appendices do not include in the valid denominator for calculating the medical home measure any cases with responses classified as “Don’t Know/Refused” or system missing to any subcomponent topic variable (Figure 2, child #6). Nationally, about 5 percent of children in the sample were not included in valid denominators for the medical home composite measures from the 2001 and 2005/06 NS-CSHCN surveys.

Although the revisions to the 2005/06 NS-CSHCN medical home questions resulted in changes to the parameters used to derive several of the sub-component topic variables, the “on every” scoring algorithm for creating the overall medical home composite measure remains the same for both administrations of the NS-CSHCN.

**Resources for measuring medical home using NS-CSHCN data:** Appendices A\_1 through B\_2 offer a set of resources to guide SAS and SPSS users in constructing the sub-component topic variables and composite medical home measure using data elements from the 2001 or 2005/06 NS-CSHCN. These resources include:

- Overview tables with derived variable names from SAS and SPSS medical home scoring programs and associated NS-CSHCN data elements

- SAS and SPSS programming code for creating the overall medical home composite measure, each of the various sub-component topic scores and associated interim variables from 2001 or 2005/06 NS-CSHCN
- Summary tables showing aggregate data results for the Medical Home composite measure, sub-component topics and associated interim variables using 2001 or 2005/06 NS-CSHCN data elements
- Tables with the text, response options and associated skip pattern details for each of the survey items from the 2001 or 2005/06 NS-CSHCN used in the SAS and SPSS medical home scoring programs
- Unweighted univariate distributions for the dichotomous medical home composite measure, each of the sub-component topic variables and associated interim variables produced by the SAS or SPSS program code for constructing medical home measures from the 2001 or 2005/06 NS-CSHCN

Another resource includes the NS-CSHCN indicator codebooks available through the Data Resource Center for Child and Adolescent Health website: [www.childhealthdata.org](http://www.childhealthdata.org)

### 3.4 Measuring medical home using 2003 NSCH data elements

The overall medical home measure from the 2003 NSCH is a composite of six different sub-component topics assessing the following:

1. Child has at least one “personal doctor or nurse” (PDN)
2. Preventive care visits during past 12 months
3. Family-centered care from PDN
4. Access to needed urgent care and/or phone advice from PDN
5. Access to needed specialist care and/or specialized services or equipment
6. PDN follow up after child sees specialist and/or gets specialized health services

Table 6 organizes the six medical home topics assessed in the 2003 NSCH according to the specific definitional components of the AAP medical home model each is designed to measure. The number of survey items used to construct the six 2003 NSCH sub-component topic variables ranges from as few as one to as many as nine (see Table 2).

**Sub-component denominators:** All children in the 2003 NSCH sample are included in the valid denominators for the personal doctor or nurse (PDN) and the preventive care visit sub-component topics. The remaining medical home topics assessed in the 2003 survey apply only to denominators of children with at least one PDN and need for the types of care addressed within a topic. Children without any PDN and those who have a PDN but did not need the specific types of care being assessed are not included in the valid denominators for these sub-component topics. Rather, these cases are designated as “legitimate skips” for scoring purposes because there is no reason to ask parents questions about care children did not need. The valid denominators for the six medical home sub-component scores derived from 2003 NSCH are as follows:

1. Two sub-component topics (*At least one personal doctor or nurse; Preventive care visit during past 12 months*) include all children in the sample in the denominators.
2. One sub-component topic (*Family-centered care from PDN*) includes only children who have at least one PDN in valid denominator. Children who do not have any PDN are considered “legitimate skips” for scoring purposes.
3. Three sub-component scores (*Access to urgent care/phone advice from PDN; Access to needed specialist care/services; Follow up by PDN after child gets specialist care and/or specialized services*) pertain only to children who have PDNs and needed the

specific types of care addressed by each sub-component topic. Children without any PDN and those who have a PDN but did not need the types of care pertaining to these three sub-components topics are considered “legitimate skips” for scoring purposes.

***Sub-component thresholds and legitimate skips:*** Table 6 summarizes the threshold and legitimate skip criteria for each of the 2003 NSCH sub-component topics. The SAS and SPSS scoring programs provided in Appendices C\_1 and C\_2, create the six derived variables listed in the second column of the table – one for each of the sub-component topics used to construct the 2003 NSCH medical home composite measure.

**Table 6:** Measuring Medical Home using 2003 NSCH data elements: Sub-component topic variables

<i>Sub-component topics measured within each AAP Medical Home definitional component</i>	<b>Variable name*</b>	<b>Threshold criteria</b>	<b>Legitimate skip criteria</b>
<b>RELATIONSHIP WITH SPECIFIC PROVIDER</b>			
1. Has at least one “personal doctor or nurse” (PDN)	S5Q01	“Yes” to question about having a personal doctor or nurse	No skips; asked for all sample children
<b>ACCESSIBLE</b>	--	--	--
<b>FAMILY-CENTERED</b>			
2. Receives family-centered care from PDN	PDNCOM_2	Responses of “Usually or Always” (≥ 75pts) to questions on PDN listening and time spent with child	Responses indicating child does not have a personal doctor or nurse (PDN)
<b>CONTINUOUS</b>	--	--	--
<b>COMPREHENSIVE</b>			
3. Preventive care visit, past 12 months	PC_2	One or more preventive medical care visits with any health care provider during past 12 months	No skips; asked for all sample children
4. Access to needed urgent care and/or phone advice from PDN	CARE_2	Responses of “Usually or Always” (≥ 75pts) for each type of care needed by child	Responses indicating child does not have PDN or has PDN but did not need these types of care during past 12 months
5. Access to needed specialist care and/or specialized services	ACC_2	Responses of “Small Problem or No Problem” (≥ 75pts) accessing each type of care needed by child	Responses indicating child does not have PDN or has PDN but did not need specialized care or services during past 12 months
<b>COORDINATED</b>			
6. Follow up by PDN after child gets specialist care and/or specialized services	COOR_2	Responses of “Usually or Always” (score of ≥ 75pts) for each type of care for which child needed follow up	Responses indicating child does not have PDN or has PDN but did not need specialized care or services during past 12 months
<b>COMPASSIONATE</b>		<i>Assessed by questions within the Family-centered Care component</i>	
<b>CULTURALLY EFFECTIVE</b>		<i>Included in the Family-centered Care sub-component topic scoring</i>	
-- Not assessed by survey (See Table 2 for details) *SAS variable names shown in the table; see Appendices for SPSS variable names			

***Scoring sub-component topics:*** Somewhat different methods are used to develop the medical home sub-component topic variables derived from the 2003 NSCH and 2007 NSCH and

NS-CSHCN surveys. The scoring methods for the NS-CSHCN and 2007 NSCH excludes cases from the valid denominator when there are responses of “Don’t know or Refused” to one or more of the questions used for deriving a sub-component topic variable; the 2003 NSCH method only excludes cases when there are “Don’t know or Refused” responses to all questions used for deriving a sub-component topic variable.

The scoring programs for each survey also employ different strategies to identify cases that meet the threshold criteria for a sub-component topic. The 2003 NSCH uses an approach, described in detail elsewhere,<sup>3</sup> previously developed for use with other surveys which typically assessed three or more concepts per sub-component topic. This method assigns points ranging from 0-100 to responses for each relevant question and calculates the average score across all valid responses within a sub-component topic. A score of 75 points or greater is used as the threshold criteria. When applied to surveys that assess a maximum of two concepts per sub-component topic, such as the 2003 NSCH, the “average score” method yields the same results as the approach for the NS-CSHCN and 2007 NSCH which requires a discrete set of responses, such as “Usually or Always,” on every relevant question within a sub-component topic in order to meet the threshold criteria.<sup>13</sup>

These different methods used for creating sub-component topic variables are artifacts of on-going efforts to develop robust methodologies for measuring medical home using population-based child health surveys. The differences approaches to medical home measurement taken earlier by the NSCH and NS-CSHCN have been reconciled through the alignment of the 2007 NSCH medical home content and scoring parameters with those used for the 2005/06 NS-CSHCN.

The threshold criteria for the 2003 NSCH sub-component topics used to measure medical home are outlined below

1. Child has at least one personal doctor or nurse
  - a. Constructed from a single item
  - b. *Threshold criteria* = YES responses indicating child has either one or more than one personal doctor or nurse

2. Preventive care visit during past 12 months
  - a. Constructed from a single item
  - b. *Threshold criteria* = Responses indicating that child had one or more preventive care visits with any provider during the past 12 months
3. Family-centered care from PDN
  - a. Constructed from 2 or 3 items
  - b. *Threshold criteria* = responses of USUALLY or ALWAYS ( $\geq 75$  points) to questions asking about communication with child's PDN and adequacy of time PDN spends with child, AND if needed, responses of USUALLY or ALWAYS to question about access to interpreter services during child's health care visits
  - c. The question about need for interpreter help during child's health care visits is asked only for children living in households with primary languages other than English
4. Access to needed urgent care and/or phone advice from PDN
  - a. Constructed from up to four items
  - b. Filter questions are used to identify the children who needed urgent care or phone advice, or both from a PDN during the past 12 months. Only respondents reporting that the child needed one or both of these specific types of care are asked the related questions about how often such care was available when needed.
  - c. *Threshold criteria* = If needed during the past 12 months, responses of USUALLY or ALWAYS ( $\geq 75$  points) to question on availability of urgent care from child's PDN, AND if needed during the past 12 months, responses of USUALLY or ALWAYS ( $\geq 75$  points) to question on availability of phone advice from child's PDN
5. Access to needed specialist care and/or specialized services or equipment
  - a. Constructed from up to 4 items
  - b. Filter questions are used to identify children who have PDNs and needed care from a specialist doctor or needed specialized health services/equipment, or both during the past 12 months. Only respondents reporting that the child needed one or both of these specific types of care are asked whether they experienced any problems accessing the care needed by the child.
  - c. *Threshold criteria* = If needed, responses of "NO PROBLEM or SMALL PROBLEM" ( $\geq 75$  points) to getting specialist care for child, AND if needed, responses of "NO PROBLEM or SMALL PROBLEM" ( $\geq 75$  points) to getting specialized health services or equipment needed by child

6. Follow up by PDN after child receives specialist care and/or specialized services
  - a. Constructed from up to two items
  - b. Filter questions are used to identify children who have PDNs and needed care from a specialist doctor or specialized health services/equipment, or both during the past 12 months. Only respondents reporting that the child needed one or both of these specific types of care are asked how often child's PDN follows up with family after child receives such care.
  - c. *Threshold score* = If needed during the past 12 months, responses of USUALLY or ALWAYS ( $\geq 75$  points) when asked how often child's PDN follows up after child visits a specialist, AND if needed during the past 12 months, responses of USUALLY or ALWAYS ( $\geq 75$  points) when asked how often child's PDN follows up after child gets specialized health services

Additional information, including details such as the survey item numbers of questions used for the medical home measures and the interim variables used to construct each sub-component topic variable are found with the SAS and SPSS user resources in Appendices C\_1 and C\_2.

**2003 NSCH medical home composite measure:** The scoring programs provided in Appendices C\_1 and C\_2 use the “on every” method (see section 3.2) to construct a dichotomous composite measure that classifies children as either having or not having a medical home. To be categorized as having a medical home using 2003 NSCH, children must:

- A) Meet all three 2003 NSCH baseline criteria for having a medical home (Fig. 1)
- B) AND either receive care that meets the threshold criteria for or qualify as a legitimate skip on each of the three additional sub-component topics

Figure 3 on the next page presents six hypothetical cases – each illustrating how a different set of the scoring results culminates in the final medical home outcome using the “on every” approach to construct the composite measure. For brevity, the variable names shown in Table 6 are used in Figure 3 to denote each of the six sub-component topics. The details of the derived variables are further described in Table 6 and in Appendices C\_1 and C\_2.

**Figure 3: National Survey of Children’s Health (NSCH), 2003**

Scoring algorithm examples for the 2003 NSCH Medical Home composite measure

		<i>Does child meet threshold criteria?</i>					
<i>Derived variable names for the 2003 NSCH sub-component topics (see Table 6)</i>		Child #1	Child #2	Child #3	Child #4	Child #5	Child #6
<b>“Baseline criteria for medical home”</b>	<b>S5Q01</b>	Yes	Yes	Yes	Yes	Yes	--
	<b>PDNCOM_2</b>	Yes	Yes	Yes	Yes	Yes	--
	<b>PC_2</b>	Yes	Yes	Yes	No	Yes	Yes
-----							
	<b>CARE_2</b>	Yes	X	X	Yes	No	--
	<b>ACC_2</b>	Yes	Yes	X	Yes	Yes	--
	<b>COOR_2</b>	Yes	Yes	X	Yes	Yes	--
<b>Qualifies as having a Medical Home?</b>		<b>YES</b>	<b>YES</b>	<b>YES</b>	<b>NO</b>	<b>NO</b>	<b>--*</b>

X = Legitimate skip – child did not need the type of care addressed by this topic

-- = System missing or “Don’t know/Refused” responses for all questions used to derive sub-component topic variable

\* = Cases with “Don’t know/Refused” or systems missing responses to the question asking whether child has at least one personal doctor or nurse are not asked any further questions in the medical home section of the survey. These cases are coded as “missing” and not included in the valid denominator when calculating the overall medical home composite score.

As illustrated in Figure 3, the 2003 NSCH baseline criteria for having a medical home require a child to have at least one personal doctor or nurse from whom he or she receives family-centered care AND at least one preventive medical care visit with any provider during the past year. In addition to meeting the three baseline criteria for medical home, children must also receive care that meets the threshold criteria OR qualify as a “legitimate skip” because care was not needed on each of the three additional sub-component topics measured in the survey (Figure 3, child #1 through child #3) to be classified as having a medical home. As illustrated by example child #4, failing to achieve even one of the three baseline criteria classifies a child as not having a medical home. On the other hand, children who meet all three of the baseline criteria qualify as having a medical home even if they did not need the types of care assessed under the remaining three sub-component topics (Figure 3, child #3).

Children with responses of NO, “Don’t Know, Refused” or system missing to the personal doctor/nurse question (S5Q01) are automatically classified as not having a medical home, even if they meet the threshold criteria for having a preventive care visit with any provider

during the past 12 months (Figure 3, child #6). This is because no further questions in the medical home section of the survey are asked for children reported to not have a personal doctor or nurse and those with unknown responses. Subsequently, these cases appear as “system missing” for all questions used to derive the remaining sub-component topic variables other than that for preventive care visits.

Finally, the NSCH medical home scoring programs provided in the appendices treat cases that have either system missing or “Don’t Know/Refused” responses to the personal doctor or nurse question – and consequently appear as system missing for the questions used to assess all remaining topics other than preventive care visits – as missing data. These cases are not included in the valid denominator when calculating the composite measure (Figure 3, child #6).

Nationally, about 1 percent of sample children were not included in the valid denominator for the 2003 NSCH medical home composite measure.

***Resources for measuring medical home using 2003 NSCH data:*** Appendices C\_1 and C\_2 offer resources to guide SAS and SPSS users in constructing the sub-component topic variables and the composite measure of medical home using data elements from the 2003 NSCH, including:

- Overview tables with derived variable names from SAS and SPSS medical home scoring programs
- SAS and SPSS programming code for creating the overall medical home composite measure, each of the sub-component topic scores and associated interim variables from 2003 NSCH data elements
- Summary tables with aggregate results for the 2003 NSCH Medical Home composite measure outcome, sub-component scores and associated interim variable
- Tables with text, response options and associated skip pattern details for each of the survey items used in the SAS and SPSS scoring programs
- Unweighted univariate distributions for the dichotomous medical home composite measure, sub-component topic variables and associated interim variables produced by the SAS or SPSS programs. Another useful resource, the 2003 NSCH indicator codebook, is available at: [www.childhealthdata.org](http://www.childhealthdata.org)

### **3.5 Medical home measurement using 2007 NSCH data elements**

The overall medical home measure from the 2007 NSCH is a composite of five different sub-component topics assessing the following:

1. Child has at least one personal doctor or nurse
2. Family-centered care
3. Getting needed referral
4. Usual source(s) for care
5. Effective care coordination

Table 7 organizes the five medical home topics assessed by the 2007 NSCH according to the specific definitional components of the AAP medical home model each is intended to measure. A total of 18 questions from the 2007 NSCH are used to develop the medical home composite measure.

**Sub-component topic denominators:** Two of the 2007 NSCH sub-component topics are relevant for all sampled children; the content of the remaining topics apply only to those children who needed the types of care being asked about. Children with survey responses indicating a specific type of care was not needed are designated as “legitimate skips” for scoring purposes because parents cannot legitimately be asked questions about care that children did not need or receive. The relevant denominators for the five sub-component topics are as follows:

1. Two sub-component topics (*Have at least one personal doctor or nurse; Usual source(s) for care*) include all children in the sample.
2. One sub-component topic (*Family-centered care*) includes only those children who used one or more of the following services during the past 12 months: preventive medical care, preventive dental care, mental health care, needed or received care from specialist doctors. Children who did not use any of these services during the past 12 months are considered “legitimate skips” for scoring purposes.
3. Two sub-component topics (*No problems obtaining referrals; Effective care coordination*) pertain only to children who qualify as needing these services during the past 12 months. Children with survey responses that do not qualify for needing these services are considered “legitimate skips” for scoring purposes.

**Sub-component topic thresholds and legitimate skips:** Table 7 summarizes the threshold and legitimate skip criteria for each of the 2007 NSCH medical home sub-component topics. The SPSS scoring program provided in Appendix D\_1 create the five derived variables listed in the second column of the table – one for each of the sub-component topics used to construct the medical home composite measure from 2007 NSCH data elements.

**Table 7:** Measuring Medical Home using 2007 NSCH data elements: Sub-component topic variables

<i>Sub-component topics measured within each AAP Medical Home definitional component</i>	<b>Variable name*</b>	<b>Threshold criteria</b>	<b>Legitimate skip criteria</b>
<b>RELATIONSHIP WITH SPECIFIC PROVIDER</b>			
1. Has at least one “personal doctor or nurse”	PDN	Responses “Yes, one person” or “Yes, more than one person” to personal doctor or nurse question	No skips; asked for all sample children
<b>ACCESSIBLE</b>			
--			
<b>FAMILY-CENTERED</b>			
2. Receives family-centered care	FAMCENT	Responses of “Usually or Always” to all family-centered and culturally effective care questions	Responses indicating child did not use any preventive medical care or preventive dental care or mental health or specialist care during past 12 months; interpreter services question asked only for children with a primary household language other than English
<b>CONTINUOUS</b>			
--			
<b>COMPREHENSIVE</b>			
3. Getting needed referrals	NOREFPRB	“Not a problem” response to question about obtaining needed referrals	Response indicating child did not need a referral in the past 12 months to see any doctors or receive any services
4. Usual source(s) for care	USUAL	Responses indicating child has regular source(s) of health care other than hospital emergency room	No skips; asked for all sample children
<b>COORDINATED</b>			
5. Getting effective care coordination when needed	CARECOOR	Responses indicating family currently receives assistance with care coordination or gets needed extra help, and if needed, responses of “Very satisfied” to the questions about doctors’ communication with each other or with child’s school/other programs.	The care coordination questions are asked only for children who used 2 or more of the following services in the past 12 months: preventive medical care, preventive dental care, mental health care, needed or received care from a specialist doctor. Children who used less than 2 services or do not currently get and did not need extra help to coordinate child’s care are considered legitimate skips.
<b>COMPASSIONATE</b>		<i>Assessed by questions within the Family-centered Care component</i>	
<b>CULTURALLY EFFECTIVE</b>		<i>Responses to questions addressing culturally effective care included in the Family-centered Care sub-component scoring</i>	

-- Not assessed by survey (See Table 2 for details) \*2007 SPSS variable names shown in the table

**Scoring sub-component topics:** The scoring parameters for 2007 NSCH medical home sub-component topics in Table 7 are briefly outlined below:

1. Child has at least one personal doctor or nurse
  - a. Constructed from a single item; asked for all children in the sample
  - b. *Threshold criteria* = Responses of YES, ONE PERSON or YES, MORE THAN ONE PERSON to question asking if there are one or more persons that the respondent considers as being the child's personal doctor or nurse
  
2. Receives family-centered care
  - a. Constructed from up to seven questions
  - b. *Threshold criteria* = responses indicating child used 1 or more of the following services in the past 12 months: preventive medical care, preventive dental care, mental health care, needed or received care from a specialist doctor AND responses of USUALLY or ALWAYS to all five family-centered care questions, AND if primary household language is other than English AND child's family needed interpreter help to speak with child's doctors, responses of USUALLY or ALWAYS to accessing interpreter services during child's health care visits
  
3. No problems obtaining referrals
  - a. Constructed from up to 2 items
  - b. *Threshold criteria* = YES response to referrals being needed in past 12 months in order for child to see other doctors or receive services AND response of NOT A PROBLEM to getting the needed referrals
  
4. Usual source(s) for care
  - a. Constructed from two items
  - b. *Threshold criteria* = responses indicating that child has regular source(s) for care other than hospital emergency room when sick or advice is needed about his/her health
  
5. Receives effective care coordination
  - a. Constructed from up to six items
  
  - b. *Threshold criteria* = Child used 2 or more of five different health services during the past 12 months (preventive medical care, preventive dental care, mental health care, needed or received care from a specialist doctor) AND affirmative responses indicating (a) family currently receives help coordinating child's care and does

not need extra help, OR if extra help was needed, family USUALLY received the help desired; OR (b) no help coordinating care was reported AND no need for extra help coordinating care was reported; AND (c) if child used any of five different specialized services and communication between doctors was needed, responses of VERY SATISFIED with that communication, AND (d) if needed, responses of VERY SATISFIED with communication between doctors and child's school or other programs.

Additional information such as the survey-specific item numbers, exact text of the medical home questions, and details of the interim variables developed to construct each sub-component topic score is included with the user resources for the 2007 NSCH in Appendices D\_1.

**2007 NSCH medical home composite measure:** The SPSS scoring program in Appendix D\_1 uses the ‘on every’ method (see section 3.2) to construct the dichotomous composite measure classifying children as either having or not having a medical home. To qualify as having a medical home as measured by the 2007 NSCH, children must:

- A) Meet both 2007 NSCH baseline criteria for having a medical home (see Fig. 1)
- B) AND, either receive care meeting the threshold criteria or qualify as a legitimate skip on each one of the three additional sub-components topics.

Figure 4 presents six hypothetical cases – each illustrating how different combinations of sub-component topic results culminate in the final medical home outcome using the “on every” approach to construct the composite measure. For brevity, the variable names shown in Table 7 are used in Figure 4 to denote each of the five sub-component topics. The details of these derived variables are described in Table 7 and in Appendix D\_1.

**Figure 4: National Survey of Children’s Health (NSCH), 2007**

Scoring algorithm examples for the 2007 NSCH Medical Home composite measure

<i>Derived variable names for the 2007 NSCH sub-component topics (see Table 7)</i>	<i>Does child meet threshold criteria?</i>						
	Child #1	Child #2	Child #3	Child #4	Child #5	Child #6	
<b>“Baseline criteria for having a medical home”</b>	<b>PDN</b>	Yes~	Yes	Yes	No	Yes	Yes
	<b>USUAL</b>	Yes	Yes	Yes	Yes	Yes	Yes
	<b>FAMCENT</b>	Yes	Yes	X	Yes	Yes	--
	<b>NOREFPRB</b>	Yes	X	X	Yes	No	Yes
	<b>CARECOOR</b>	Yes	X	X	Yes	Yes	Yes
<b>Qualifies as having a Medical Home?</b>	<b>YES</b>	<b>YES</b>	<b>YES</b>	<b>NO</b>	<b>NO</b>	<b>NO</b>	<b>--*</b>

X = Legitimate skip – child did not need the type of care addressed by this topic

-- = System missing or “Don’t know/Refused” responses to 1 or more questions used to derive the sub-component topic variable

\* = Children with missing or “Don’t know/Refused” responses for 1 or more sub-component topics variables are NOT included in the valid denominator when calculating the overall medical home composite score

As illustrated in Figure 4, the 2007 NSCH minimum criteria for medical home requires children to have at least one personal doctor/nurse AND usual source(s) for care when sick or advice about health is needed. In addition to meeting both of these baseline criteria, children also must receive care meeting the threshold criteria for OR qualify as a “legitimate skip” on each of three additional sub-components topics measured in the survey (Figure 4, child #1 through child #3). Failing to meet either one of the baseline criteria automatically categorizes a child as not having a medical home, regardless of whether he or she receives care meeting the thresholds for all the other sub-component topics (Figure 4, child #4). On the other hand, children meeting the two baseline criteria qualify as having a medical home, even if they did not need any of the other types of care assessed within the three remaining sub-component topics (Figure 4, child #3).

Conversely, if a child meets the baseline criteria for having a medical home and received care that did not meet the threshold for one or more sub-component topics, the result is “no medical home” (Figure 4, child #5). Finally, cases with responses classified as “Don’t Know/Refused” or system missing on the subcomponent topic variables are not included in the denominator when calculating the medical home measure (Figure 4, child #6). Nationally, about 4 percent of children in the sample were excluded from valid denominator used for the 2007 NSCH medical home composite measure.

**Resources for measuring medical home using 2007 NSCH data elements:** Appendix D\_1 offers a set of resources to guide SPSS users in constructing the sub-component topic variables and composite medical home measure using 2007 NSCH data elements. These resources include:

- Overview tables with derived variable names from the SPSS medical home scoring programs and associated 2007 NSCH data elements
- SPSS programming code for creating the overall medical home composite measure, each of the various sub-component topic scores and associated interim variables
- Summary tables showing aggregate data results for the Medical Home composite measure, sub-component topic and associated interim variables using 2007 NSCH data elements
- Tables with the text, response options and associated skip pattern details for each of the survey items from the 2007 NSCH used in the SPSS medical home scoring programs
- Unweighted univariate distributions for the dichotomous medical home composite measure, each of the sub-component topic variables and associated interim variables produced by the SPSS programming code for constructing the 2007 NSCH medical home measure
- Other resources for data users are the 2007 NSCH indicator codebooks available through the Data Resource Center for Child and Adolescent Health website:  
[www.childhealthdata.org](http://www.childhealthdata.org)