

NORTH AMERICAN REGISTRY OF MIDWIVES

EXAMINATION PROGRAM TECHNICAL REPORT 2010

August 2011

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Introduction

This report provides an overview of examination program activities and the statistical properties of Forms J and K of the Certified Professional Midwife (C.P.M.) Examination, administered by the *North American Registry of Midwives* (NARM). Successful completion of the C.P.M. examination must be attained before the title of Certified Professional Midwife is conferred.

The forms of the examination discussed in this report were administered in a number of locations at different times throughout the United States from February 2010 through October 2010. The data from these administrations were combined and served as the basis for the statistics appearing in this report.

SECTION I: EXAMINATION ADMINISTRATION

The examination was administered via a paper-and-pencil format using scannable answer sheets under a secure, proctored arrangement. Two forms of the examination were administered: Form K and an alternate form, Form J. Alternate Form J was administered to those examinees who had previously taken Form K. The forms were administered on the following dates:

Examination Forms		
Testing Date	K	Alt. J
Feb., 2010	63	13
Aug., 2010	102	6
Oct., 2010	33	11
Totals	198	30

This pool of candidates taking Forms K and J were used as the basis of the analyses appearing in this report. Note: One additional alternate form, Form H. was administered, but was not included in these analyses because of the small sample size [N = 1].

SECTION II: GENERAL TEST RESULTS

Each test form consisted of a total of 350 questions contained in two test booklets of 175 questions each. The examinations were administered in two sessions, morning and afternoon, with a separate answer sheet used for each session. The mean, standard deviation, reliability coefficient and standard error of measurement for Form K and Form J are based on this total of 350 (see Table 1). The raw score mean is the average number of items answered correctly by the group of examinees. For example, the table shows that the mean or average raw score for Form K was 296.20.

The Kuder-Richardson-20 (or KR-20) reliability reflects the degree of consistency in the test score.

The Standard Error of Measurement is interpreted as a standard deviation of the errors of measurement for the test, and is directly influenced by both the size of the standard deviation and the degree of unreliability of the test. For Form K the standard error of measurement is equal to 6.22. The standard error of measurement is often interpreted as a type of “confidence interval” for an individual test score - the greater the standard error of measurement, the more the score reflects chance factors.

Table 2 summarizes the pass/fail statistics for Form K and Form J in terms of both the raw number of candidates and the percentage of candidates. For example, 162 of the 198 candidates (or 81.82%) who took Form K passed the exam.

Table 3 and Table 4 presents the frequency distributions of the raw scores for Form K and Form J, along with univariate statistics including the mean, median, mode, standard deviation, skewness and kurtosis statistic. Skewness measures the extent to which the scores are symmetric about the mean. The value obtained for Form K, for example (-1.47997) indicates that the distribution of scores is slightly skewed to the left (i.e., "negatively skewed"). This is also reflected in the fact that the median is higher than the mean. Kurtosis measures the flatness of a distribution or the heaviness of its tails. The standard is the normal distribution with a value of 0. Distributions with short tails and few extreme scores have negative kurtosis. The positive kurtosis indicated for Form K points to a distribution with a larger number of extreme scores. The frequency distributions in Table 3 (Form K) and Table 4 (Form J) includes the number, percentage, and cumulative percentage of candidates who obtained each raw score. For instance, in Table 3, we can see that 7 examinees (or 3.5% of the total pool of 198 candidates) obtained a raw score of 302 on Form K of the exam, and that approximately 55% of the candidates achieved a score of 302 or lower.

Each form of the test consists of seven sections. The following indicates the number of items in each of the seven sections of Form K and Form J:

Section	Number of Items	
	Form K	Form J
1	27	17
2	22	17
3	33	33
4	84	88
5	115	124
6	48	52
7	21	19
Total	350	

Tables 5 through 11 present test statistics for each of the seven sections including the raw score mean and median, standard deviation and Kuder-Richardson-20 reliability coefficient.

Table 1: Examination Statistics

	Form K	Form J
Number of Scored Items	350	350
Total Number of Examinees	198	30
Raw Score Mean	296.20	276.90
Raw Score Standard Deviation	23.5	21.3
KR-20 Reliability Coefficient	0.93	0.89
Standard Error of Measurement	6.22	7.06
Raw Passing Score	280	277
Percent Passing Score	80.00	79.14

Decision Consistency (Livingston)	0.93	0.87

Table 2: Pass/Fail Frequency Distribution

	Form K	Form J
Pass	162 (81.82%)	18 (60.00%)
Fail	36 (18.18%)	12 (40.00%)
Total	198 (100.00%)	30 (100.0%)

*Note: Form J has been used for repeaters in 2010, which is why the pass rate is much lower.

Table 3: Frequency Distribution of Form K Raw Scores

Raw Score	Frequency	Cumulative Frequency	Percent	Cumulative Percent
204	1	1	.5	.5
205	1	2	.5	1.0
218	1	3	.5	1.5
219	1	4	.5	2.0
229	1	5	.5	2.5
235	1	6	.5	3.0
236	1	7	.5	3.5
243	1	8	.5	4.0
252	1	9	.5	4.5
254	1	10	.5	5.0
258	1	11	.5	5.5
260	1	12	.5	6.0
261	1	13	.5	6.5
265	1	14	.5	7.0
267	2	16	1.0	8.0
268	1	17	.5	8.5
269	2	19	1.0	9.5
270	2	21	1.0	10.5
272	2	23	1.0	11.5
273	1	24	.5	12.0
274	1	25	.5	12.5
275	2	27	1.0	13.5
276	1	28	.5	14.0
277	4	32	2.0	16.0
278	1	33	.5	16.5
279	3	36	1.5	18.0
281	1	37	.5	18.5
282	3	40	1.5	20.0
283	4	44	2.0	22.0
284	1	45	.5	22.5
285	3	48	1.5	24.0
286	3	51	1.5	25.5
287	5	56	2.5	28.0
288	2	58	1.0	29.0
289	2	60	1.0	30.0
290	5	65	2.5	32.5
291	3	68	1.5	34.0

292	5	73	2.5	36.5
293	2	75	1.0	37.5
294	3	78	1.5	39.0
295	2	80	1.0	40.0
296	4	84	2.0	42.0
297	4	88	2.0	44.0
298	4	92	2.0	46.0
299	4	96	2.0	48.0
300	3	99	1.5	49.5
301	4	103	2.0	51.5
302	7	110	3.5	55.0
303	1	111	.5	55.5
304	2	113	1.0	56.5
305	3	116	1.5	58.0
306	8	124	4.0	62.0
307	5	129	2.5	64.5
308	8	137	4.0	68.5
309	2	139	1.0	69.5
310	4	143	2.0	71.5
311	5	148	2.5	74.0
312	5	153	2.5	76.5
313	4	157	2.0	78.5
314	3	160	1.5	80.0
315	6	166	3.0	83.0
316	5	171	2.5	85.5
317	3	174	1.5	87.0
318	2	176	1.0	88.0
319	2	178	1.0	89.0
320	4	182	2.0	91.0
321	2	184	1.0	92.0
322	2	186	1.0	93.0
323	1	187	.5	93.5
324	2	189	1.0	94.5
325	2	191	1.0	95.5
326	1	192	.5	96.0
328	2	194	1.0	97.0
329	1	195	.5	97.5
330	2	197	1.0	98.5
332	1	198	.5	100.0

Sample Size: 198

Minimum: 204	Maximum: 332
Mean: 296.20	Median: 300.5
Mode: 308	
Standard Deviation: 22.51	
Skewness: -1.47997	Kurtosis: 3.269108

Table 4: Frequency Distribution of Form J Raw Scores

Raw Score	Frequency	Cumulative Frequency	Percent	Cumulative Percent
232	1	1	3.3	3.3
236	1	2	3.3	6.6
240	1	3	3.3	9.9
255	1	4	3.3	13.2
258	1	5	3.3	16.5
261	2	7	6.7	23.2
263	1	8	3.3	26.5
269	3	11	10.0	36.5
273	1	12	3.3	39.8
277	1	13	3.3	43.1
278	2	15	6.7	49.8
280	1	16	3.3	53.1
283	1	17	3.3	56.7
284	2	19	6.7	63.1
287	1	20	3.3	66.4
288	3	23	10.0	76.4
289	1	24	3.3	79.7
296	1	25	3.3	83.0
301	1	26	3.3	86.3
302	1	27	3.3	89.6
303	2	29	6.7	96.3
312	1	30	3.3	100.0

Sample Size: 30

Minimum: 232
Mean: 276.90
Mode: 269
Standard Deviation: 20.12
Skewness: -0.523589

Maximum: 312
Median: 279
Kurtosis: -0.055998

Table 5: Test Statistics: Form K and Form J – Content Area 1

Statistic	Form K	Form J
Number of Tests Graded	198	30
Number of Graded Items	27	17
Mean Score	23.61	13.30
Median Score	24	13
Standard Deviation	2.44	1.97
K-R 20 Reliability Coefficient	0.54	0.29

Table 6: Test Statistics: Form K and Form J – Content Area 2

Statistic	Form K	Form J
Number of Tests Graded	198	30
Number of Graded Items	22	17
Mean Score	19.27	13
Median Score	19	13
Standard Deviation	1.98	2.03

K-R 20 Reliability Coefficient	0.46	0.29
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Table 7: Test Statistics: Form K and Form J – Content Area 3

Statistic	Form K	Form J
Number of Tests Graded	198	30
Number of Graded Items	33	33
Mean Score	26.32	23.87
Median Score	27	24
Standard Deviation	2.96	3.21
K-R 20 Reliability Coefficient	0.56	0.43

Table 8: Test Statistics: Form K and Form J – Content Area 4

Statistic	Form K	Form J
Number of Tests Graded	198	30
Number of Graded Items	84	88
Mean Score	71.06	68.87
Median Score	72	71
Standard Deviation	6.29	5.64
K-R 20 Reliability Coefficient	0.76	0.67

Table 9: Test Statistics: Form K and Form J – Content Area 5

Statistic	Form K	Form J
Number of Tests Graded	198	30

Number of Graded Items	115	124
Mean Score	99.39	101.90
Median Score	101	102.5
Standard Deviation	8.16	8.18
K-R 20 Reliability Coefficient	0.81	0.74

Table 10: Test Statistics: Form K and Form J – Content Area 6

Statistic	Form K	Form J
Number of Tests Graded	198	30
Number of Graded Items	48	52
Mean Score	40.21	41.80
Median Score	40.5	43
Standard Deviation	3.45	4.36
K-R 20 Reliability Coefficient	0.66	0.53

Table 11: Test Statistics: Form K and Form J – Content Area 7

Statistic	Form K	Form J
Number of Tests Graded	198	30
Number of Graded Items	21	19
Mean Score	16.35	14.17
Median Score	17	14
Standard Deviation	2.00	1.66
K-R 20 Reliability Coefficient	0.35	0.33

SECTION III: SCALED SCORES

The following conversion formula was used for determining the equivalent scaled scores for each raw score. The scaled scores are expressed over a range of 0 to 99, with 75 as passing.

Form K

$$\text{Scaled Score} = .3428571 \times \text{Raw Score} - 20.999988$$

Form J

$$\text{Scaled Score} = .3287671233 \times \text{Raw Score} - 16.06849315$$

In the unlikely event of a scaled score below zero, it will be reported as zero.

SECTION IV: THE SKILLS ASSESSMENT EXAMINATION

Depending upon their specific professional preparation, NARM certification candidates may be required to participate in a Skills Assessment Examination. (Jurisdictions that use the NARM examination program for licensure purposes use the Skills Assessment Examination at their option). The Skills Assessment Examination is a performance test that combines work sample and simulation tasks that reflect the activities of professional midwives. There are two forms of the Skills Assessment Examination, Form A and Form B.

The Skills Assessment has been administered 446 times since 1999. Seventeen have failed this assessment. Of those 17, 8 have retaken the Skills Assessment and passed.

The Skills Assessment is not required for certification. There are several optional methods for verifying skills. The Skills Assessment is one of those methods. Other methods include graduating from an accredited midwifery school, obtaining a state license from a state that has been evaluated for equivalency by NARM, or having all training done with CPMs and with verification of skills by multiple CPMs in a clinical setting. The Skills Assessment is required for candidates who have not verified skills through one of the other methods.

SECTION V: TEST DEVELOPMENT

NARM revises the written examination every 3 years, or after approximately every 400 candidates have taken the test. Two forms are active at any given time, so that repeat candidates may take a different form of the exam.

Item Writing

Four Item Writing workshops were held from 2008 through 2011. The participants are listed below. The workshops were led by Ida Darragh, Director of Testing for NARM. All participants were CPMs with varied levels of training and varied practice sites. Item Writers are given an Item Writing Handbook (see attachment) in preparation for the 3 hour training. Each receives an outline of test specifications and a list of reference books. Multiple copies of the reference books are provided at the workshop site. After training, the participants divide into groups of three to write questions. Questions are identified by content area and test specification, and by cognitive level, and each question is referenced to at least two of the reference books by title and page number. The workshop lasts two days, and most items are written during the workshop. Item Writers do have the option of continuing to write and submit new items after the workshop. Items written at the workshops are kept in a New Item database until they have been reviewed and edited. They are then added to the master item database. The first review is done by a team of former item writers who meet by conference call, and who edit the new items for clarity and style. References are also checked. The second and final review is done by the CPM members of the NARM Board.

All new items also go through a cut score process and are assigned a numerical value from the cut score workshop (see information on cut scores). New forms of the exam are created through a review of item stats of previous exams and a review of the test specifications of new items. Items removed from the previous exam are replaced by comparable items from the same content areas. A new passing score is determined by the cut score ratings of items on the new form of the exam.

Item Writer Participants 2008-2011

Feb 2-3, 2011 Albuquerque, NM

first name	last name	city	state
A'Maya	Ettien	El Paso	TX
Jessiac	Frechette-Gutfreund	Chimayo	NM
Cassaundra	Jah	Cedar Crest	NM
Jules	Johnston	Rio Rancho	NM
Denise	Kielpinski	Rio Rancho	NM
Alyson	Kuntz-Butler	El Paso	TX
Judith	Lane	El Paso	TX
Dusten	Marie	Albuquerque	NM

first name	last name	city	state
Rebecca	Rose	Albuquerque	NM
Jennifer	West	Albuquerque	NM

August 21-22, 2010 Portland, OR

first name	last name	city	state
Susan	Bender	North Powder	OR
Dianne	Boeger	Port Townsend	WA
Loritha	Fitzpatrick	Sequin	WA
Anne	Frye	Portland	OR
Wendy	Gordon	Portland	OR
Brandee	Grider	Portland	OR
Katherine	Howe	Portland	OR
Kate	Markell	Portland	OR
Laurie	Mednick	Portland	OR
Lorell	Miller	Portland	OR
Kristin	Rogers	Belleview	WA
Joey	Torgrimson	Portland	OR

Oct 4-5, 2008 Anchorage, AK

first name	last name	city	state
Peggy	Halsey	Wasilla	AK
LeShine	Herfindahl	Girdwood	AK
Erinn	Mandeville	Valdez	AK
Kristine	Olson	Anchorage	AK
Jessica	Sawyer	Palmer	AK
Susan	Terwilliger	Eagle River	AK
Sandra	Weeks	Delta Junction	AK

June 27-28, 2008, Fennimore, WI

first name	last name	city	state
Paula	Bernini Feigal	Menomonie	WI
Jessica	DeFilippo	Hertel	WI
Sherry	DeVries	Fennimore	WI
Mary	Sommers	Chicago	IL
Gretchen	Spicer	Avoca	WI
Rosalyn	Wenger	Bart	PA

Item review teams

Friday March 6, 2009 Team one
Karen Brock, Alabama
Jessica Sawyer, Alaska
Gretchen Spicer, Wisconsin
Rinn Mandeville, Alaska

Monday, March 16, 2009 Team two
Mary Ann Richardson, Tennessee
Kay Burrows, Arizona
Sherry Stevens, New Hampshire
Laura Pierce, Toronto

NARM Board reviews March 23, 2009
Ida Darragh, Arkansas
Shannon Anton, Vermont
Debbie Pulley, Georgia
Carol Nelson, Tennessee
Brynne Potter, Virginia
Miriam Khalsa, Massachusetts

Items written in 2010 and 2011 have not yet been reviewed nor entered into the master item database. Another Item Writing workshop is being scheduled for January, 2012. All items written in 2010-2012 will be reviewed for the next form of the exam.

**NORTH AMERICAN REGISTRY OF MIDWIVES
PROFESSIONAL MIDWIFE CERTIFICATION EXAMINATION**

CUT-SCORE STUDY REPORT

Dr. Gerald A. Rosen
Psychometrician

April 12, 2009

Introduction

Since its founding in 1987, the North American Registry of Midwives (NARM) has created and sponsored the certification examination for professional midwives. Individuals meeting all credentialing requirements are awarded the Certified Professional Midwife (CPM) designation. The examination is one part of a certification process intended to validate entry-level knowledge, skills and experience vital to responsible midwifery practice. The certification program is administered in the context of NARM's advancement of the midwifery model of care and the role of the independent midwife as a critically important provider of woman-centered care.

The NARM CPM examination consists of 350 items administered in two parts over 8 hours on a single day of testing twice a year. In accordance with its examination development schedule, Form K of the CPM examination was recently produced. Having finalized Form K, NARM decided to set the cut-score for the examination in advance of its use in August 2009. To that end, a diverse group of 12 subject matter experts (SMEs) selected by and representing NARM met on April 4, 2009 in Scottsdale, AZ. NARM's measurement consultant, Dr. Gerald A. Rosen, Psychometrician, facilitated the meeting. (The complete list of SMEs who participated in the workshop can be found in Table 1.)

Table 1

Participants in the Cut-Score Study Workshop, 4/4/2009, Scottsdale, AZ

<u>Name</u>	<u>Credential</u>	<u>City</u>	<u>State</u>	<u>Position</u>	<u>Years certified/ years experience</u>
Shannon Anton	CPM	Bristol	VT	midwife educator	13/17
Debbie Pulley	CPM	Lilburn	GA	midwife	14/20
Sherry DeVries	CPM	Fennimore	WI	midwife educator	8/21
Christy Tashjian	CPM	Austin	TX	midwife	8/11
Carol Nelson	CPM	Summertown	TN	midwife	14/38
Anne Marie Palzer	CPM	Mesa	AZ	midwife	3/3
Mary Langois	CPM	Phoenix	AZ	midwife	2/28
Robin Sharples-Ray	CPM	Glendale	AZ	midwife	3/3

Miriam Khalsa	CPM	Sherborn	MA	midwife	12/27
Brynne Potter	CPM	Charlottesville	VA	midwife	4/8
Pamela Crowl	CPM	Security	CO	midwife	6/25
Deanna Irvine	CPM	Flagstaff	AZ	midwife	6/10

Meeting Activities

1. The meeting began with a summary of the work accomplished to date in the production of examination Form K and a discussion of the goals of the cut-score study.
2. Dr. Rosen presented a detailed overview of and underlying rationale for criterion-referenced cut-scores. As part of the overview, it was explained that because criterion-referenced passing scores are independent of the score distribution it is theoretically possible for any number of examinees to pass or fail the examination depending solely upon their mastery of the practice-based knowledge base, rather than on the performance characteristics of other candidates. Finally, there was a discussion of the objective of the cut-score process, i.e., estimating the score point consistent with the mission of the certification program that would minimize errors of classification.
3. The committee spent the next hour describing the characteristics of the minimally competent certification-level candidate. Such a candidate would have a mastery of the knowledge base such that s/he would be “just good enough” to be credentialed. The description of the “just good enough” candidate included skills and knowledge possessed and skills and knowledge not necessarily possessed. The discussion progressed until all participants expressed both satisfaction and comfort with the resulting description; i.e., until consensus was reached.
4. A modification of a criterion-referenced cut-score determination method attributed to Angoff was described to the committee. The committee was asked to conceive of 100 candidates who shared the exact characteristics that had been delineated in the previous discussion of the minimally competent (i.e., “just good enough”) candidate. Their task was to rate each item on the examination by answering, in each case, the following question. “How many of the 100 “just good enough” candidates will answer this question correctly. Before making their final independent ratings, the committee members produced practice ratings for 10 questions from the examination. Ratings on the practiced items were announced and discussed with particular attention paid to the highest and lowest ratings and the judges’ rationales for each.
5. After the practice ratings and discussion, the judges applied the modified-Angoff method to the 350 items comprising the examination beginning with the first item. Ratings for practice items were not necessarily retained. The results of the modified-Angoff standard setting procedure can be found in Table 2. The judges had at their disposal the examination with items in content order, the examination answer key, and examination statistics (p-values and point-biserial correlations) for previously used items.

Results

Table 2 summarizes the results of the modified-Angoff cut-score study. For the 12 judges, the cut-scores range from 79.5% to 87.5% or 277.6 to 306.3 raw score points. For 11 of the judges, the cut-scores ranged from 79.5% to 83.3% or 277.6 to 291.6 raw score points. (Table 3 summarizes the results of the modified-Angoff cut-score study excluding the ratings obtained from the judge who produced the cut-score of 87.5%.)

Table 3 describes a reasonably narrow range of cut-scores, especially given the length of the examination, and suggests that 11 of the 12 judges applied the concept of “minimal competence” based on the consensus arrived at during the initial stages of the study. Therefore, the judge who produced the 87.5% cut-score was defined as an outlier.

Table 2

Results of the Modified-Angoff Cut-Score Study Procedure

<u>Judge</u>	<u>Cut-Score</u>
1	83.32% (291.6)
2	81.66% (285.8)
2	80.88% (283.1)
4	82.90% (290.2)
5	81.65% (285.8)
6	80.91% (283.2)
7	82.06% (287.2)
8	83.19% (291.2)
9	87.48% (306.2)
10	82.76% (289.7)
11	82.08% (287.3)
12	79.26% (277.4)
Mean (Cut-Score)	82.35 (288.2)
Standard Deviation	1.99

Table 3

Results of the Modified-Angoff Cut-Score Study Procedure - (Outlier Removed)

<u>Judge</u>	<u>Cut-Score</u>
1	83.32% (291.6)
2	81.66% (285.8)
2	80.88% (283.1)
4	82.90% (290.2)
5	81.65% (285.8)
6	80.91% (283.2)
7	82.06% (287.2)
8	83.19% (291.2)
10	82.76% (289.7)
11	82.08% (287.3)
12	79.26% (277.4)
Mean (Cut-Score)	81.88 (286.6)
Standard Deviation	1.21

Conclusion

There are additional factors for NARM to consider before making a final decision on the cut-score for Form K of the CPM examination: 1) it is very common for criterion-referenced cut-scores based on the pooled, independent ratings of SMEs serving as judges to be adjusted downward. This is because experts, serving as judges, remain experts, not certification-level candidates sitting for an examination. As experts, there is a tendency for their ratings to be somewhat stringent no matter how practiced they may be in the use of a criterion-referenced cut-score method. Hence, modified-Angoff cut-scores, like most criterion-referenced cut-scores, are often adjusted downward. The standard error of measurement, which will not be known until after the examination is administered, is often used as a guide in making cut-score adjustments;

2) NARM SME panels have traditionally set very stringent cut-scores that have required downward adjustment in order to be consistent with the overall mission of the NARM CPM program as an entry-level credential; and 3) NARM's desire to ensure that the number of otherwise qualified candidates who fail the examination due to measurement error alone is minimized.

Appendices

Two complete data sets, one corresponding to Table 2 and one corresponding to Table 3 in this report, consisting of excel spreadsheets containing all 4200 SME ratings are retained by NARM as appendices to this report.

References

Angoff, W.H. (1971). Scales, norms and equivalent scores. In R.L. Thorndike (Ed.), Educational Measurement. Washington, DC: American Council on Education.

Cizek, G.J.(2001). Setting Performance Standards: Concepts, Methods, and Perspectives. Mahwah, NJ: Lawrence Erlbaum Associates.

Additional note: The NARM Board, in consultation with Dr Rosen, decided to reduce the cut score by 1 1/2 SD to 280 (80%).