



A Comparative Psychometric Study for Development of Questionnaires to Assess Knowledge and Practices among Frontline workers and Mothers regarding Home-Based Newborn Care (HBNC) and Home-Based Care for Young Child (HBYC) Programs in Delhi

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ABSTRACT

Objectives: Developing a validated and reliable questionnaire for ASHA workers and mothers regarding Home-Based Newborn Care (HBNC) and Home-Based Care for Young Child (HBYC) programs.

Methods: For designing the questionnaire(s), initially 80 items on 3 constructs of HBNC and HBYC program were identified. For the content validity (study 1), a panel of three content matter experts reviewed the initial draft and based on logical analysis initial questionnaire was designed. In studies 2, 3, and 4, ASHA workers (n = 17) and Mothers (n=10) completed the HBNC and HBYC questionnaire to review the clarity of the items for determining the face validity. ASHA workers (n=10) were provided with the modified questionnaire to determine internal consistency in study 5. In study 6, test -retest reliability was undertaken involving ASHA workers (n=10) by filling the questionnaire twice over a period of two weeks. In study 7, construct validity was undertaken involving Accredited Social Health Activists (n=16) and Graduates (n=16).

Results: As part of content validity, experts agreed (CVI > 0.9; Agreement, Kendall's W > 0.3, p<0.001) that 2 out of 3 constructs were relevant to evaluate knowledge.. The final modified HBNC and HBYC questionnaire had acceptable internal consistency (Cronbach's α > 0.7), test-retest reliability (r > 0.85), and highly differentiated (U =3.5 and U=0, p < 0.001) knowledge scores for HBNC and HBYC items between ASHAs and Graduates.

Conclusions: This study provides a validated and reliable questionnaire to assess the HBNC and HBYC programs in Delhi.

Key-words: ASHA, HBNC, HBYC, Reliability, Validity, Instrument, Psychometry

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INTRODUCTION

Community Based Interventions (CBIs) consists of wide range of intervention strategies that plays an important role in newborn survival beside other maternal and child health care components and community health workers (CHWs) are the backbones of these interventions [1]. Neonatal care through home visits by the CHWs is one of the best community based approach and it is associated with reduced neonatal mortality in resource-limited settings ($RR=0.73(0.65 \text{ to } 0.83)$; $P<0.0001$) [2]. Studies conducted from 1998 to 2008 in South Asian countries [3]. suggests that neonatal care through visits reduces the newborn deaths in High-mortality settings ranges from 30% to 61%. Among various CBIs, two most important CBIs that are running in India are Home-Based Newborn Care (HBNC) and Home-Based Care for Young Child (HBYC) programs. HBNC started in 2011 to reduce newborn death rates with the help of 6 to 7 home visits by the Accredited Social Health Activist (ASHA). ASHAs are one of the Community Health workers who are trained in HBNC and HBYC programs. In HBNC, she provides information to mothers about complete essential newborn care, cord care, exclusive breastfeeding, identification and prevention of infants from illness and referring them in case of danger signs, detection and special care for pre-term and low birth babies [4]. As HBNC only take cares of infants up to 42nd week of age, a program named HBYC started in 2018 as an extension to the HBNC program with the aim of reducing child mortality and improving nutrition status and early childhood development of a child up to their 15 months age. In HBYC program, ASHA provides five home visits at definite intervals and delivers information to the mothers about child nutrition, early childhood development, health and WASH practices [5]. Although HBNC program helps in reducing neonatal mortality rates but studies conducted in different states

of India to assess the functioning of these programs shows inefficiency in the working of ASHA workers in case of HBNC program and very few assessment studies are available for the assessment of HBYC program [6]. Among these studies [6], only a few studies have some description of very few validity and reliability tests for assessing knowledge and practices in HBNC [7-8] and HBYC programs [9-11]. Also, to the best of our knowledge, no study is present that has provided validated and reliable questionnaires for the assessment of knowledge, practices of workers and mothers under these programs in Delhi. Therefore, the aim of the present study was to develop a validated and reliable tool for the assessment of HBNC and HBYC programs in Delhi.

Methods

Present research is a validation and reliability study for designing a tool for assessing knowledge of ASHA workers and mothers under HBNC and HBYC programs in Delhi. The sample size was determined purposively and subjects selected were ASHA workers of South and Northwest Districts of New Delhi, mothers of the children from 1 month to 15 months age, and graduates coming to the Central Library of IGNOU, Maidan Garhi, New Delhi were also recruited. The flow chart of research design and methodology is present in Figure 1. For the preparation of the questionnaire, 3 major constructs based on HBNC and HBYC programs were selected under which 80 items were present i.e. 5 items on General information, 22 items on assessing the knowledge and awareness of ASHA workers and 53 items on assessing the knowledge and practices of mothers of infants. These 80 items were selected based on the operational guidelines of HBNC, HBYC, ASHA training module 6 and 7 [4, 5, 12-13] and reviewing the previous researches [6]. Details of all the Constructs and items are present in Figure 2

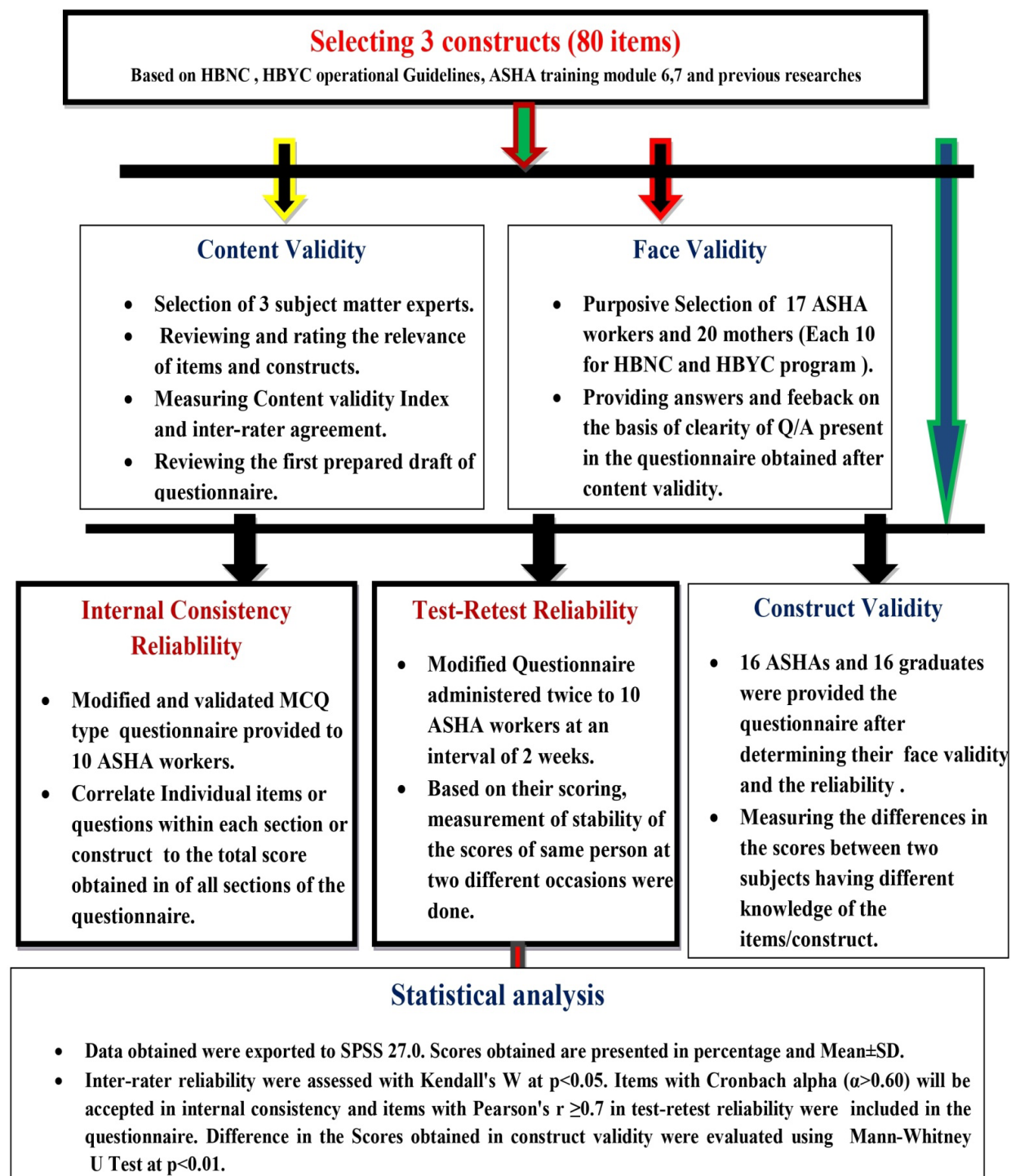


Figure 1: Flow Chart of the Research Design

Assessing content validity

To determine the Content validity of the items, 3 Experts were selected having experience of more than 5 years in the field of public health, child and maternal health in Government institutions of New Delhi. Afterwards, the first

prepared draft containing list of all items were given to experts for rating each item on the basis of relevancy related to HBNC and HBYC programs. Rating were given based on a five-point Likert scale (1–5), which represents low to high agreement. Scores on relevance were used



to generate a content validity index (CVI), which is calculated as number of experts answering 3 or 4 for a particular item or total number of experts [14]. Thereafter, first draft of the MCQ questionnaires were prepared for reviewing by the same experts to check each question's or option's content and language and based on their oral feedbacks, the modified questionnaire were drafted.

Assessing face validity

The modified questionnaires were then administered to 17 ASHA workers and 20 mothers (10 mothers each for HBNC and HBYC program) for determining the face validity of the questionnaire. They were told to answer the question and also rate each question based on clarity (Yes '1' or No '2'). For simplicity, they were asked to encircle the question number if they face any difficulty in understanding a particular question, so that it means "No". For questions that were clear and easily understandable, there was no need for any marking and it was considered as "Yes" on the basis of clarity. Also, subjects were told to provide reasons for the unclear items. After face validity, modified and validated Multiple Choice Questionnaire (MCQ) with 5 options were designed.

Assessing Internal Consistency Reliability

The MCQ was administered to other 10 ASHA workers to determine the Internal consistency reliability [15]. Correlation of Individual items or questions within each section or construct to the total score of all sections were examined [16].

Assessment of test-retest reliability

For test-retest reliability, this questionnaire were provided to other 10 ASHAs for answering

twice at an interval of 2-3 weeks and the stability of the scores of an item obtained from the same person on two separate occasions were measured [17].

Assessing construct validity

For determining the construct validity, (ASHA - 16) and Graduates (16) were provided the questionnaire and differences in the scores between participants having different knowledge of the construct or items were determined [18]. In both reliability tests and construct validity test, each correct answer was given a score of 1 and 0 score for wrong answers and "Don't Know" option.

Statistical Analysis

Data obtained were exported to the Statistical Package for Social Sciences (SPSS v27.0, IBM Corporation, NY, USA) for analysis. For Content validity test, CVIs for items and constructs were measured using Microsoft Excel 2010 and their acceptable values were less than 0.79 and 0.89 respectively [14]. Inter-rater reliability among the raters during the content validity were assessed with Kendall's W at $p < 0.05$. Scores of all the questions obtained from Subjects during validity and reliability tests were presented as percentages and Mean $\pm$ SD. Data obtained from the subjects during internal consistency reliability were used to find Cronbach's alpha (α). As this is a newly constructed scale the value of $\alpha > 0.60$ was accepted [19]. In case of Test-retest reliability, scores obtained from the subjects were correlated before and after 2 weeks using Pearson's 'r' value, with items having $r \geq 0.7$ were included in the questionnaire. Difference in the Scores obtained in construct validity were evaluated using the Mann-Whitney U Test at $p < 0.001$.

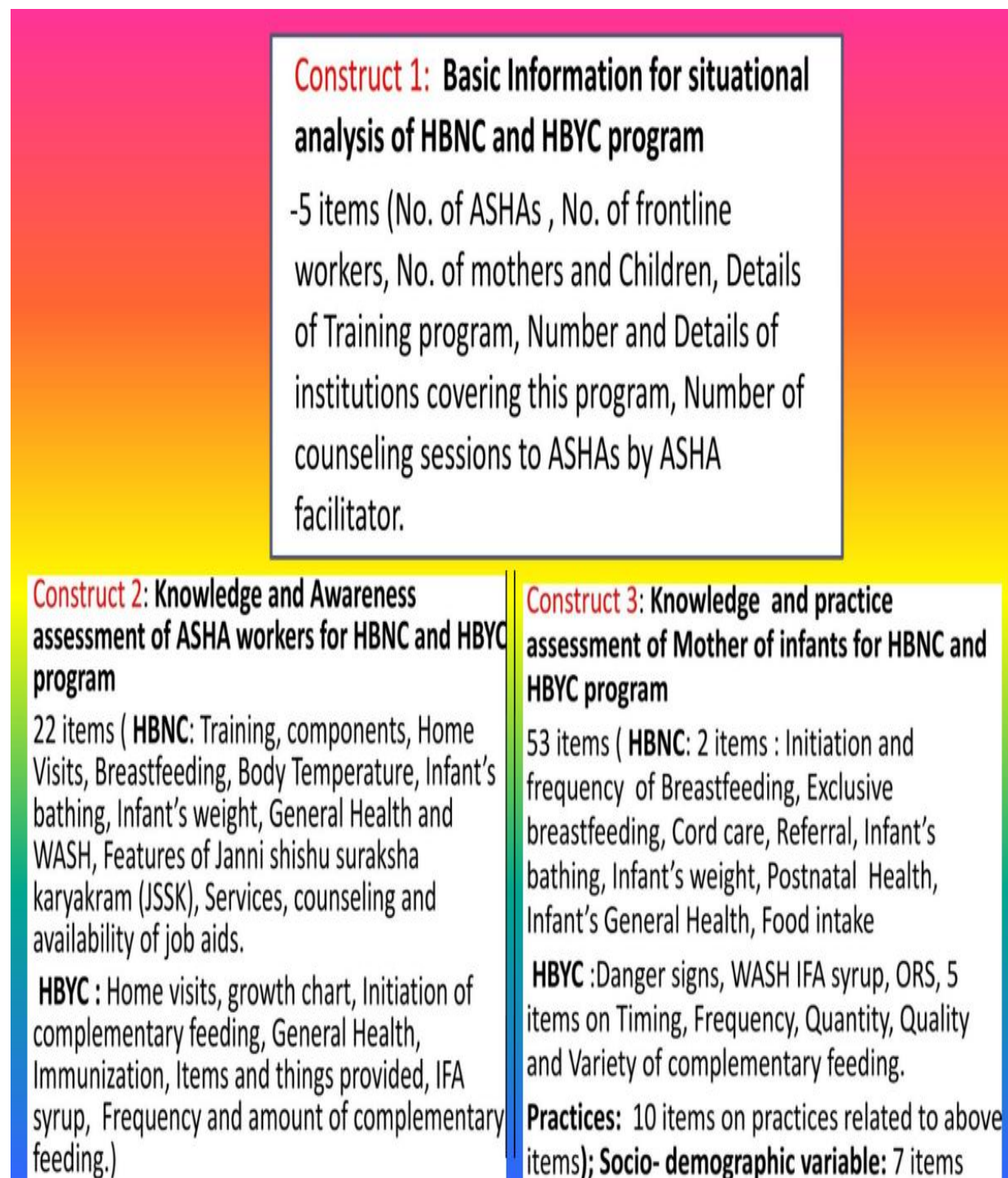


Figure 2 : Constructs and Items Present in First Draft for Conducting Content Validity

Results

In content validity test, experts suggested to exclude the construct 1 (see Figure 1) from the first draft as this information was provided by the Delhi State Health Mission and ASHAs have

no access to these information. Under construct 2, the Overall CVI of the 10 items present in the HBNC section was 0.97, except item number 10 (knowledge and features of Janni Shishu Suraksha Karyakram (JSSK) whose CVI was



0.67. So item 10 was excluded. All the statements in item 11 and 12 (checklist of services and counselling provided by ASHA workers) were suggested to be included by the experts. In item 13 some job aids were not suggested to be included. Similarly, in HBYC section, there were 11 items and overall CVI of the items is 0.97 except for item 5 (Necessary consumable items provided for infants) whose CVI was 0.67. So this item was excluded. There are statistically significant fair agreement between the different raters in rating the construct of HBNC (Kendall's $W = 0.38$; $P < 0.022$) and HBYC (Kendall's $W = 0.301$; $P < 0.037$) section. Item 12-18 were based on HBYC related practices and experts suggested to include all the items in the study.

Under construct 3, overall CVI of the 10 items present in the HBNC section and 9 items present in the HBYC section was 1.0 with former having Kendall's W value 0.467 ($P < 0.009$) and latter's Kendall's W value 0.361 ($P < 0.039$) showing statistically significant fair agreement between the different raters in rating this construct. All the items from 10-26 that involve socio- demographic characteristics were suggested to be included except item 21 (category of the subject i.e General, OBC etc). After this analysis, experts reviewed the first draft of prepared questionnaires based on 72 items and suggested modifications in question number 2, 8, 2, and 8 from questionnaires 2.1, 2.2, 2.3 and 2.4, respectively. Comparison of changes between initial draft of questionnaire and final questionnaire are presented in Figure 3. Results obtained after conducting face validity test among 17 ASHA workers having mean age 33.3 ± 5.9 are presented in Table 1. High total score for questions 6, 7, 10, 12, 14 and 17 in section 1 and in questions 7, 8 and 9 of section 2 suggests that modification were needed in these questions to produce a tool capable of discriminating between good and poor knowledge of ASHA workers. Also ambiguous questions were rephrased later based on ASHA's feedback. Face validity of HBNC questionnaire among 10 mothers having mean age 23.6 ± 5.9 shows high total score for

questions 2, 3, 10 and 13. Also, ambiguity occurred in the questions 3, 5, 6, 7, 11 and 12. Question 3 were based on assessing knowledge regarding exclusive breastfeeding but the word "less than 6 months" create confusion and most of the mothers choose wrong option so it changed to "What would you prefer to feed a four months old baby".

Question 5 was based on cord care and its meaning in hindi is "Garbhnaal". But it were creating ambiguity to many mothers and so it were changed to "nabhi" a similar term for cord in hindi. Question 6 were based on identification of danger signs in the baby. Here each option is loaded with 3 or 4 danger signs so it were creating difficulty in comprehending by the mothers and also takes lot of time to answer it. so only one danger signs per option were provided. Similarly, Question 7 was based on the danger signs observed in mothers after delivery, and similar modifications were made to it just as they were for Question 6. In question 11 and 12, rephrasing the words in the questions required for better understanding of the questions. Similarly, face validity of HBYC questionnaire among 10 mothers having mean age 27.3 ± 3.8 shows high total score for questions 1, 3 and 4. Ambiguity occurred in the questions 1, 4 and 12. Question number 1 was based on WASH and mothers scored very high as "All the above" option create some bias in answering the question, so this option was removed. Also some complex words in the question were removed for easy comprehension. Question number 3 is similar to Q3 of HBNC questionnaire for mothers so similar modifications were done. Question number 12 was based on identification of danger signs and it was "more than one answer type question". So it was difficult for mothers to comprehend so it were changed to MCQ type question. In HBYC practice questionnaire, three more options (Health centres, Aanganwadi Worker and Self) were added in the question related to

"Where are mothers getting their children vaccinated?" And in the question regarding "receiving food packets from the Anganwadi,"

several options were added that explained the reasons why mothers answered "No". Other questions had minor changes and were

modified based on the feedback of the mothers.

Questionnaire & Question Number	Reason for change	Initial draft (I) and Final Modified (M) Questions
2.1 & 2	Options overlapped	I: How many days does the training of HBNC lasts? 1. 10-15 days 2. 20-24 days 3. 5-10 days 4. 30-35 days 5. Don't know M: How many days does the training of HBNC lasts? 1. 15-19 days 2. 20-25 days 3. 5-10 days 4. 30-35 days 5. Don't know <u>Translated Hindi Version:</u> I: एचबीएनसी का प्रशिक्षण (ट्रेनिंग) कुल कितने दिन का होता है ? 1. 10-15 दिन 2. 20-24 दिन 3. 5-10 दिन 4. 30-35 दिन 5. पता नहीं M: एचबीएनसी का प्रशिक्षण (ट्रेनिंग) कुल कितने दिन का होता है ? 1. 15-29 दिन 2. 20-25 दिन 3. 5-10 दिन 4. 30-35 दिन 5. पता नहीं
2.2 & 8	Question related to WASH already present in section 2.1	I: What is important to do before touching and examining babies? M: Which of the following things are provided to the mother in the HBYC program? <u>Translated Hindi Version:</u> I: शिशुओं को छूने और जाँचने से पहले और बाद में क्या करना ज़रूरी है? M: निम्नलिखित में से एचबीवाईसी प्रोग्राम में माता को क्या- क्या चीज़ें प्रदान की जाती हैं ?
2.3 & 3	Faulty options that create confusion and biasness to length of some options	I: How many times a day should mothers breastfeed their newborns? 1. 20 times 2. 4 to 5 times 3. As per baby's demands and as long as baby wants 4. 8 to 10 times 5. Both options 3 and 4 6. Don't know M: How many times a day should a mother breastfeed a newborn baby? 1. 1 to 2 times 2. 3 to 4 times 3. 5 to 6 times 4. 8 to 12 times 5. Don't know <u>Translated Hindi Version:</u> I: माताओं द्वारा नवजात शिशुओं को एक दिन में कितनी बार स्तनपान कराना चाहिए? 1. 20 बार 2. 4 से 5 बार 3. शिशु के मांगने पर बार-बार और जब तक शिशु चाहें 4. 8 से 10 बार 5. विकल्प 3 और 4 दोनों 6. पता नहीं M: माता द्वारा नवजात शिशु को एक दिन में कितनी बार स्तनपान कराना बताया है ? 1. 20 से 25 बार 2. 2 से 3 बार 3. 4 से 5 बार 4. 8 से 12 बार 5. पता नहीं
2.4	Similarity in the wording of two questions creates confusion	I: How many times a day should a 6- to 9-month-old baby be fed? 1. 2 to 3 times 2. As often as the baby wants to eat 3. 4 to 5 times 4. 5 times or more 5. Don't know M: How many times a day should a baby be fed after 6 months (excluding snacks & fruits) ? 1. 1 time 2. 2-3 times 3. 4-5 times 4. 6 times 5. Don't know <u>Translated Hindi Version:</u> I: 6 से 9 महीने के बच्चे को दिन में कितनी बार खाना खिलाना चाहिए? 1. 2 से 3 बार 2. बच्चा जितनी बार खाना चाहे 3. 4 से 5 बार 4. 5 बार या उससे ज्यादा 5. पता नहीं M: 6 महीने होने के बाद शिशु को दिन में कितनी बार खाना खिलाना शुरू करना चाहिए (स्नैक्स और फलों को छोड़कर) ? 1. 1 बार 2. 2-3 बार 3. 4-5 बार 4. 6 बार 5. पता नहीं

Figure 3 : Comparison Between Questions Present in Initial and Final Questionnaire

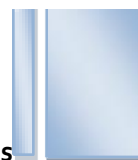
**Table 1: Pilot Questionnaire for ASHAs (HBNC & HBYC) - Result (n=17)**

Question	Correct Answer (%)	Don't know response (%)	Ambiguous	Result *Changes made
Section 1 (HBNC)				
1	70.5	11.7	No	A, D
2	58.8	11.7	No	A, D
3	70.5	Nil	No	D
4	58.8	Nil	No	D
5	82.35	Nil	Yes	B,C
6	94.1	Nil	Yes	B,C
7	94.1	Nil	Yes	C
8	23.5	Nil	No	D
9	82.3	Nil	Yes	C
10	100	Nil	Yes	C
11	88.8	Nil	No	D
12	94.1	Nil	Yes	C
13	76.4	Nil	No	D
14	94.1	5.8	Yes	A,C
15	82.3	5.8	No	D
16	76.4	5.8	No	D
17	100	11.7	No	E
18	82.3	11.7	Yes	E
Section -2 (HBYC)				
1	76.4	Nil	No	D
2	52.9	Nil	Yes	B, C
3	64.7	Nil	Yes	C
4	94.1	Nil	No	D
5	35.2	Nil	No	D
6	58.8	Nil	No	D
7	100	Nil	No	C
8	100	Nil	No	B, C
9	100	Nil	No	B, C
10	82.3	Nil	No	C
11	29.4	5.8	No	A, D
12	29.4	Nil	Yes	B, C
13	17.6	Nil	Yes	C
14	29.4	Nil	Yes	C
15	29.4	Nil	No	D
16	41.1	Nil	Yes	B, C

* A- Don't know Rephrasing not needed, B- Confusing Question (Rephrasing), C- Confusing Options (Rephrasing) D- Unchanged, E- Exclusion

The results obtained from the Internal consistency reliability test of HBNC and HBYC

knowledge questionnaires from 10 ASHA workers are presented in Table 2. A medium



score was obtained for the total HBNC and HBNC questionnaire and for all the items. The reliability was acceptable for the total HBNC and HBYC questionnaire ($\alpha = 0.78$; $\alpha = 0.70$). When individual constructs were analyzed, all the items

achieve internal consistency ranging from (0.62-0.78) in HBNC and (0.61-0.74) in HBYC. So all the items of HBNC and HBYC questionnaires were included in the study.

Table 2: Internal consistency of HBNC and HBYC questionnaire (n=10)

Items	Score range	Score obtained (Mean $\pm$ SD)	Cronbach's alpha (α)
HBNC Questionnaire			
HBNC training	0-2	1.6 $\pm$ 0.51	0.73
HBNC components	0-2	1.6 $\pm$ 0.51	0.64
HBNC visits	0-2	1.5 $\pm$ 0.52	0.62
Breastfeeding	0-2	1.7 $\pm$ 0.48	0.74
Infant temperature	0-2	1.5 $\pm$ 0.52	0.62
Infant weight	0-2	1.6 $\pm$ 0.51	0.75
Health & WASH	0-2	1.5 $\pm$ 0.52	0.78
Infant bath	0-2	1.7 $\pm$ 0.48	0.62
Total	0-16	12.7 $\pm$ 2.40	0.78
HBYC Questionnaire			
HBYC visits & Components	0-2	1.4 $\pm$ 0.51	0.70
Growth chart	0-2	1.4 $\pm$ 0.51	0.64
Complementary feeding (Initiation)	0-2	1.7 $\pm$ 0.48	0.61
Health & Immunization	0-2	1.4 $\pm$ 0.51	0.64
Child health Items	0-2	1.4 $\pm$ 0.51	0.64
IFA Syrup	0-2	1.6 $\pm$ 0.51	0.67
Complementary Feeding (Frequency and Amount)	0-4	1.6 $\pm$ 0.69	0.74
Total	0-16	10.5 $\pm$ 5.16	0.70

Results of Test-retest reliability of the HBNC and HBYC questionnaire that were conducted over a period of two weeks shown in Table 3

indicates that a significant correlation were found for both total score and individual construct scores ($r > 0.7$, $p < 0.01$) in HBNC

questionnaire and significant correlation was also found for both total score and individual

construct scores ($r > 0.7$, $p < 0.05$) in HBYC questionnaire.

Table 3: Test-Retest reliability of HBNC and HBYC Questionnaire (n=10)

Items	Score range	Baseline KQ# Score (To)	Follow-up KQ# Score (T1)	Correlation (Total Scores)	p-value
		(Mean $\pm$ SD)	(Mean $\pm$ SD)	R	
HBNC Questionnaire					
HBNC training	(0-2)	1.5 $\pm$ 0.52	1.6 $\pm$ 0.51	0.816	<0.004*
HBNC components	(0-2)	1.7 $\pm$ 0.48	1.6 $\pm$ 0.51	0.802	<0.005*
HBNC visits	(0-2)	1.8 $\pm$ 0.42	1.7 $\pm$ 0.48	0.764	<0.01*
Breastfeeding	(0-2)	1.8 $\pm$ 0.42	1.7 $\pm$ 0.48	0.764	<0.01*
Infant temperature	(0-2)	1.6 $\pm$ 0.51	1.7 $\pm$ 0.48	0.802	<0.005*
Infant weight	(0-2)	1.7 $\pm$ 0.48	1.6 $\pm$ 0.51	0.802	<0.005*
Health & WASH	(0-2)	1.5 $\pm$ 0.52	1.4 $\pm$ 0.51	0.816	<0.004*
Infant bath	(0-2)	1.5 $\pm$ 0.70	1.8 $\pm$ 0.42	0.745	<0.013*
Total		13.30$\pm$1.49	13.10$\pm$1.37	0.852	<0.002*
HBYC Questionnaire					
HBYC visits & Components	(0-2)	1.2 $\pm$ 0.63	1.2 $\pm$ 0.63	0.72	<0.018**
Growth chart	(0-2)	1.0 $\pm$ 0.66	0.8 $\pm$ 0.63	0.79	<0.06**
Complementary feeding (Initiation)	(0-2)	1.7 $\pm$ 0.48	1.8 $\pm$ 0.42	0.76	<0.01**
Health & Immunization	(0-2)	1.3 $\pm$ 0.67	1.2 $\pm$ 0.63	0.88	<0.001**
Child health Items	(0-2)	1.2 $\pm$ 0.63	1.2 $\pm$ 0.63	0.72	<0.018**
IFA Syrup	(0-2)	1.6 $\pm$ 0.51	1.7 $\pm$ 0.48	0.80	<0.005**
Complementary Feeding (Frequency and Amount)	(0-4)	1.5 $\pm$ 0.97	1.4 $\pm$ 0.96	0.82	<0.003**
Total		9.60$\pm$2.06	9.3$\pm$1.88	0.86	<0.001**

#KQ= Knowledge Questionnaire

* Pearson's correlation test with significance of $p < 0.01$.

** Pearson's correlation test with significance of $p < 0.05$.

Characteristics of the participants who participated in construct validity tests are described as below:

Among ASHA workers, 100% (N=16) females and 0% (N=0) males participated with having a mean age (34.12 $\pm$ 9.68). Among Graduates, 37.5% (N=6) females and 62.5% (N=10) males participated with having a mean age (26.18 $\pm$

6.15). Results indicated that (Table 4) significantly higher total NK score ($U = 0$ and $U = 3.50$, $p < 0.001$) were observed in participants who trained under HBNC and HBYC programs compared to those who did not study any nutrition and public health subjects in their curriculum. Similarly, higher significant NK scores were obtained for seven individual items



of the HBNC questionnaire ($p < 0.001$) and for the infant temperature ($P=0.019$) respectively. Similarly, For HBYC questionnaire, significantly higher NK scores were obtained for the three questionnaire items ($p < 0.001$) and for

remaining items i.e growth chart ($P=0.035$), health and Immunization ($p < 0.002$), child health items ($p < 0.005$) and Complementary Feeding (Frequency and Amount) ($P=0.035$) respectively.

Table 4: Construct validity of HBNC questionnaire (n=16)

Items	Score range	ASHAs (Mean $\pm$ SD)	Graduates (Mean $\pm$ SD)	Mann-Whitney U	P-value
HBNC					
HBNC training	0-2	1.56 $\pm$ 0.51	0.37 $\pm$ 0.61	25.5	<0.001
HBNC components	0-2	1.93 $\pm$ 0.25	0.50 $\pm$ 0.51	4.0	<0.001
HBNC visits	0-2	1.81 $\pm$ 0.43	0.62 $\pm$ 0.61	21.5	<0.001
Breastfeeding	0-2	1.5 $\pm$ 0.51	0.18 $\pm$ 0.40	12.0	<0.001
Infant temperature	0-2	1.18 $\pm$ 0.83	0.50 $\pm$ 0.63	69.5	0.019
Infant weight	0-2	1.68 $\pm$ 0.47	0.43 $\pm$ 0.51	17.5	<0.001
Health & WASH	0-2	1.43 $\pm$ 0.51	0.50 $\pm$ 0.51	36.0	<0.001
Infant bath	0-2	1.43 $\pm$ 0.72	0.50 $\pm$ 0.51	26.5	<0.001
Total	0-16	12.5$\pm$1.67	3.31$\pm$1.74	0.0	<0.001
HBYC					
HBYC visits & Components	0-2	1.31 $\pm$ 0.48	0.43 $\pm$ 0.51	38.5	<0.001
Growth chart	0-2	1.25 $\pm$ 0.83	0.68 $\pm$ 0.47	78.0	0.035
Complementary feeding (Initiation)	0-2	1.75 $\pm$ 0.45	0.50 $\pm$ 0.63	24.0	<0.001
Health & Immunization	0-2	1.19 $\pm$ 0.66	0.31 $\pm$ 0.47	54.5	<0.002
Child health Items	0-2	1.13 $\pm$ 0.62	0.31 $\pm$ 0.60	59.0	<0.005
IFA Syrup	0-2	1.50 $\pm$ 0.73	0.37 $\pm$ 0.61	38.0	<0.001
Complementary Feeding (Frequency and Amount)	0-4	1.94 $\pm$ 1.34	0.62 $\pm$ 0.71	74.0	0.035
Total	0-16	10.06$\pm$ 2.43	3.8$\pm$ 1.25	3.50	<0.001

DISCUSSION

This study provided a validated and reliable questionnaire for assessment of knowledge and practices among frontline workers and mothers regarding HBNC and HBYC programs in Delhi. The results of our study revealed that 72 out of the 80 items were retained in accordance with the experts' suggestions. For

Items related to services and counselling provided by ASHA workers during HBNC and HBYC programs, a "Yes/No" checklist was included instead of MCQs as it helps in observing the ASHAs at the field level during their home visits. Some questions in the first draft of questionnaire required improvement by



experts such as "training schedule of program" and "frequency of feeding breastmilk" as they had overlap or incorrect options. After face validity, major changes in the questionnaires included removal of "All the above" option from many MCQ questions, changing the form of technical words in the questions and matching the length of options by increasing or decreasing the words. These changes helped in reducing jargons, bias and confusions while filling questionnaires by the subjects. Inclusion of new techniques in face validity such as "encircle the questions" helped in getting in-depth information about the real problems faced by the ASHAs and especially low-literate mothers. These changes provided basis for correct and accurate assessment of mother's knowledge and practices regarding HBNC and HBYC programs and it will provide foundation for intervention studies as well. A recent study [7-8] used 7 experts for determining the content validity of HBNC knowledge assessment questionnaire reported similar results in comparison to this study. This shows that content validity could be done through 3 experts for assessing these programs as well. In this study, questionnaire's internal consistency was determined using Cronbach's value ($\alpha > 0.6$) because it is newly constructed scale, while ($\alpha > 0.7$) is considered widely accepted but it is not generalized and varies from 0.6-0.7 [19]. Studies [6, 9-11] on assessment of HBNC and HBYC programs, provide no details about the validity and reliability of the questionnaire and they only mentioned the word "pretested and validated" questionnaire in the methodology. Construct validity data shows very high significant difference between the knowledge of HBNC and HBYC programs between the

ASHA workers and Graduates as the former having training in these programs and the latter do not have, or have very little knowledge about the components of these programs. Among the strengths of this study, it is the first study providing comprehensive and detailed validated and reliable knowledge assessment regarding HBNC and HBYC questionnaires for ASHA workers. Secondly, introducing new approaches for face validity and construct validity is helping the scientific community in further validation and reliability studies. One of the limitations of this study was that reliability tests were not done for mothers due to feasibility issues. So it might be included in future researches.

Conclusion

In conclusion, the present study provides a brief, validated and reliable knowledge assessment questionnaire to assess the HBNC and HBYC programs of India. ASHAs efficiency and knowledge under these programs will be evaluated efficiently with the help of the questionnaire developed in this study. Also this study will guide the researchers to develop the validated and reliable questionnaires for related public health child and maternal health programs.

Recommendations

The study recommends that similar types of questionnaires can be developed by researchers and policymakers for assessing readiness of Frontline workers regarding these programs and utilizing the psychometric evaluation tools present in the study will provide more strength in designing of questionnaires for other public health programs as well.



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