

Research Article

# Development of a Scale for the Coordination Function of Family Physicians Regarding Antenatal Care

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## Abstract

**Aim:** The aim of this study was to develop a scale to measure the level of coordination of antenatal care by primary care services in Turkey and to evaluate the reliability and validity of this scale.

**Methods:** The scale was developed in four steps. The first three steps were generating an item pool and conducting an expert panel and pilot study. In the last step, the scale was administered to 178 women living in three suburbs of Izmir, Turkey, who had given birth between November 2013 and February 2014. The split-half and Cronbach's alpha tests were applied to assess internal consistency. Exploratory factor analysis was used to investigate construct validity.

**Results:** Six factors emerged from the factor analysis: accessibility and comprehensiveness of FHW services, accessibility and comprehensiveness of FP services, coordination of care by FPs, coordination of care by FHWs, FPs as first point of contact and recognising determinants of health. The factors explained 65.7% of the total variance. The Split-Half and Cronbach's alpha reliability coefficients were 0.7 and 0.9 respectively.

**Conclusion:** The scale developed in this study is a specific tool aimed at evaluating the coordination of antenatal care and has successful psychometric features.

**Keywords:** Coordination; Antenatal care; Validity; Reliability; Family physician

## Abbreviations

FP: Family Physician; FHW: Family Health Worker

## Introduction

Fragmented delivery of health services and poor coordination are general problems acknowledged in many countries representing different types of healthcare systems [1,2]. The results of these problems are serious, and include medication errors, duplication of diagnostic procedures, progression of disease due to inadequate delivery of preventive services, conflicting medical regimes and recommendations to patients and higher costs [3,4]. The coordination function of primary care is considered to be the key to overcoming the disconnection between the different actors in the healthcare system. Coordination is basically concerned with how relevant actors in healthcare interact and communicate in regards to delivery of services [5] and how primary care providers integrate all aspects of care when patients must use other levels of health services [6,7].

The burden of incoordination is particularly important for antenatal care, given that pregnant women typically seek care from multiple providers and failure to integrate this process can cause duplication and omission of services [8,9]. Care coordination has been shown to improve birth outcomes, especially for underserved women [10]. Therefore, the development of a specific scale for pregnancy will give more guiding information about coordination during this period.

Turkey has a fragmented antenatal care system. One part of the system is primary care, where Family Physicians (FPs) work alongside a Family Health Worker (FHW) to provide individually-oriented services. FPs are general practitioners or family medicine specialists, whereas FHWs can be midwives, nurses or emergency medicine technicians. FPs have an obligation to conduct at least 4 check-ups at specified weeks during pregnancy for all the pregnant women on their lists. Other parts of the system are secondary and tertiary care services, which are provided by obstetricians. Secondary services include state hospitals, private hospitals whose services are partially reimbursed through the social security system and completely private hospitals, while tertiary care options are university hospitals. A pregnant woman can enter the system at whatever point she chooses without any limitations or referral system. There is no mechanism to inform FPs about the visits that are made in other settings [11,12]. Studies in Turkey have indicated that during pregnancy, women use many different sources of care at the same time [13-15] and FPs are not able to fulfill their coordination function [16,17].

The aim of this study was to develop a scale to measure the level of coordination of antenatal care by primary care services in Turkey and to evaluate the reliability and validity of this scale.

## Methods

### Development process of the scale

**First step:** An item pool was generated by taking items from the

**Table 1:** The distribution of participants according to descriptive variables.

Variable	n	%
<b>Age</b>		
19-24 years	48	27.0
25-29 years	58	32.6
30-34 years	55	30.9
35 years and over	17	9.6
<b>Level of Education</b>		
Illiterate	25	14.0
Literate, but primary education incomplete	16	9.0
Primary School	73	41.0
Middle School and higher	64	36.0
<b>Time living in Izmir</b>		
≤ 5 years	45	25.3
> 5 years	133	74.7
<b>Native language</b>		
Turkish	124	69.7
Kurdish	52	29.2
Other (Arabic, Zazaki)	2	1.2
<b>Work Status</b>		
Housewife	163	91.6
Working	11	6.2
Unemployed	2	1.1
Student	2	1.1
<b>Social Security</b>		
Yes	47	26.4
No	131	73.6
<b>Monthly income</b>		
<Minimum wage	63	35.4
≥Minimum wage	115	64.6
<b>Total</b>	<b>178</b>	<b>100.0</b>

scales measuring four cardinal functions of primary care [18-21]. In the selection of items, weight was given to the coordination function of primary care, but items evaluating other functions necessary for coordination, such as first-contact, comprehensiveness and continuity, were also included. Items used in studies evaluating the coordination of prenatal care identified in a literature review were also added to the pool [22-25]. Subsequently, the research team chose 56 of the 88 items from this pool and restated them with particular reference to prenatal care.

**Second step:** In order to determine the face validity of the initial draft of the scale, an expert panel was organised comprising of three public health specialists, three FPs and two FHWs. After this panel, the number of questions was reduced to 36 and some questions were restated. It was decided that the questions should be answered on a 5 point Likert Scale (5=always, 4=usually, 3=sometimes, 2=rarely, 1=never).

**Third step:** The scale was pre-tested on a small sample (n=16),

stratified by educational level. These women did not participate in the fourth step. After this pilot study, amendments were made in terms of wording and order of the items. Six items which were noticed not to have been understood were removed.

**Fourth step:** The psychometric properties of the final version of the scale (30 items) were tested in three poor suburbs (Mevlana, Naldöken, Altındağ) of Izmir, where the municipality of Bornova district is providing a social care program. The aim was to reach all women who lived in these suburbs and had given birth between November 2013 and February 2014 (n=248) during a dental health education programme organised by the municipality. 71.8% (n=178) of the women participated in the education programme and all of these mothers were included in the present study.

## Statistical Analysis

The means and standard deviations of participants' responses to each item were calculated. The Cronbach's alpha coefficient test and split-half technique were applied to assess internal consistency. With split-half reliability, the items in the scale were divided into two groups and the relationship between respondents' scores for the two halves was computed [26].

Exploratory factor analysis was used to investigate construct validity. Principal components analysis, the most widely used form of factor analysis, was performed to analyse all the variance of a variable, including its unique variance. Varimax rotation of orthogonal rotation methods was chosen in order to produce factors which were unrelated to or independent of one another [27].

The results of the Kaiser-Meyer-Olkin (KMO) and Bartlett's test of sphericity were determined to measure sampling adequacy. Items with MSA (Measures of Sampling Adequacy) values of less than 0.5 and/or factor loadings of less than 0.4 were removed from the analysis [28]. In considering the Kaiser's criterion, the number of initial eigenvalues higher than one was used for deciding on the number of factors [26,28]. The SPSS statistical program (SPSS Statistical Package® 21.0, IBM Corporation, 2012, Armonk, NY, USA) was used for the analysis.

## Results

The average age of the women was 28.3±5.1 (minimum: 19, maximum: 42). The distribution of participants according to some descriptive variables is shown in Table 1. According to this, one in seven women was illiterate and one in four women had not completed primary education. The native language of one in three women was not Turkish and one in four women had no social security.

The means and standard deviations of the responses given to each item can be seen in Table 2. The mean scores given to items relating to the first factor, accessibility and comprehensiveness of FHW services, ranged from 4.27 to 4.69. Regarding the second factor, the accessibility and comprehensiveness of FP services, the item with the highest mean score (4.56) was "I was able to access my FP easily on foot or by car". In contrast, the item on this factor with the lowest mean score (3.61) was "I was able to get services from my FP for all my health related needs".

The lowest mean score, both on factor three and on the entire scale,

**Table 2:** Means and standard deviations of responses to items on the scale .

Factors	Items	Mean score	Standard deviation
<b>1) Accessibility and comprehensiveness of FHW's services</b>	1. My FHW informed me of how to keep myself healthy and warned me about my behaviours causing trouble in terms of my health and my baby's health.	4.50	0.99
	2. I trusted my FHW in terms of his/her knowledge and experience.	4.66	0.78
	3. My FHW explained to me clearly about my health status and things that I should do.	4.56	0.95
	4. I could easily ask any question I wanted.	4.69	0.87
	5. My FHW allocated enough time to me.	4.57	0.95
	6. My FHW was aware of all of my health problems.	4.27	1.22
<b>2) Accessibility and comprehensiveness of FP's services</b>	1. During working hours, when I had to see my FP I was able to see him/her or contact him/her by telephone.	4.19	1.27
	2. I was able to access my FP easily on foot or by car.	4.56	1.10
	3. I was able to get services from my FP for all my health related needs.	3.61	1.41
	4. My FP informed me of how to keep myself healthy and warned me about my behaviours causing trouble in terms of my health and my baby's health.	3.69	1.52
	5. My FP referred me to get services from other health care centers and physicians (obstetrician, hospital, laboratory) when needed.	3.92	1.46
	6. I trusted my FP in terms of his/her knowledge and experience.	4.34	1.08
	7. My FP explained to me clearly about my health status and things that I should do.	4.12	1.26
	8. I could easily ask any question I wanted.	4.32	1.23
	9. My FP allocated enough time to me.	4.30	1.15
<b>3) Coordination of care by FPs</b>	1. My FP was aware of all of my health problems.	3.79	1.50
	2. My FP was aware of all medicines I used.	3.99	1.42
	3. My FP informed my obstetrician of my health status, laboratory test results, etc. (by means of a letter, a telephone call, etc.).	1.48	1.12
	4. After I went to the obstetrician, my FP asked me about this visit and the obstetrician's explanations.	3.25	1.76
	5. My FP helped me to understand the explanations, examinations and laboratory tests of the obstetrician.	3.04	1.69
	6. My FP was aware of all my visits to other health centers or physicians.	3.00	1.67
<b>4) Coordination of care by FHWs</b>	1. After I went to the obstetrician, my FHW asked me about this visit and the obstetrician's explanations.	3.94	1.57
	2. My FHW helped me to understand the explanations, examinations and laboratory tests of the obstetrician.	3.85	1.53
	3. My FHW was aware of all my visits to other health centers or physicians.	3.86	1.53
<b>5) FPs as first point of contact</b>	1. When I had a new health problem, I visited my FP first.	3.77	1.48
	2. When I had a problem which required me to see a doctor on the same day, such as pain, fever or extreme vomiting, I visited my FP first.	3.60	1.53
<b>6) Recognising determinants of health</b>	1. My FP was aware of my problems affecting my health and related to my family, neighbourhood and work.	2.35	1.56
	2. My FHW was aware of my problems affecting my health and related to my family, neighbourhood and work.	2.87	1.56

FP= Family Physician; FHW= Family Health Worker; Scores: 5=always, 4=usually, 3=sometimes, 2=rarely, 1=never

was 1.48 for the item “My FP informed my obstetrician of my health status, laboratory test results, etc”. When the percentage distribution of responses to this item was calculated, only 5.1% of women reported that their FP always informed their obstetrician. The average mean scores for items on the factor evaluating the coordination of care by FHWs ranged from 3.85 to 3.94.

The mean scores on the fifth factor, FPs as first point of contact, were 3.60 and 3.77, while the mean scores on the final factor, recognising determinants of health, were 2.35 and 2.87.

The item “The payments for examinations/prescriptions by my FP was reasonable”, with an MSA (Measures of Sampling Adequacy) below 0.5 and the item “During working hours, when I had to see my FHW, I was able to see him/her”, with a factor loading below 0.4, were removed. After eliminating these two items, a factor analysis was performed again on the 28 remaining items. According to this, the

KMO value, which was found to be 0.8 and considered “meritorious” [29] showed that the data were appropriate for factor analysis. The Chi-square test statistics obtained from the Bartlett’s test of sphericity indicated statistical significance (chi-square=3106.4; p=0.000) and there were adequate correlations between pairs of items.

According to the final factor analysis, the remaining 28 items were distributed to 6 factors. The factors explained 65.7% of the total variance. The Split-Half reliability and Cronbach’s alpha reliability coefficients, which were 0.7 and 0.9 respectively, indicated an acceptable internal consistency. Factors, items, factor loadings, percentages of variance and Cronbach alpha reliability coefficients are shown in Table 3.

## Discussion

In this study, a scale has been developed aimed at evaluating the

**Table 3:** The items on the scale of the coordination function of family physicians in prenatal care assigned to the factors, their factor loadings, percentages of variance and reliability coefficients.

Factors	Items	Factor loadings	% of variance	Cronbach Alpha Value
<b>1) Accessibility and comprehensiveness of FHW's services</b>	1. My FHW informed me of how to keep myself healthy and warned me about my behaviours causing trouble in terms of my health and my baby's health.	0.750	14.9	0.8
	2. I trusted my FHW in terms of his/her knowledge and experience.	0.486		
	3. My FHW explained to me clearly about my health status and things that I should do.	0.837		
	4. I could easily ask any question I wanted.	0.813		
	5. My FHW allocated enough time to me.	0.884		
	6. My FHW was aware of all of my health problems.	0.670		
<b>2) Accessibility and comprehensiveness of FP's services</b>	1. During working hours, when I had to see my FP I was able to see him/her or contact him/her by telephone.	0.526	13.8	0.8
	2. I was able to access my FP easily on foot or by car.	0.455		
	3. I was able to get services from my FP for all my health related needs.	0.466		
	4. My FP informed me of how to keep myself healthy and warned me about my behaviours causing trouble in terms of my health and my baby's health.	0.618		
	5. My FP referred me to get services from other health care centers and physicians (obstetrician, hospital, laboratory) when needed.	0.530		
	6. I trusted my FP in terms of his/her knowledge and experience.	0.616		
	7. My FP explained to me clearly about my health status and things that I should do.	0.811		
	8. I could easily ask any question I wanted.	0.649		
	9. My FP allocated enough time to me.	0.706		
<b>3) Coordination of care by FPs</b>	1. My FP was aware of all of my health problems.	0.558	12.2	0.8
	2. My FP was aware of all medicines I used.	0.586		
	3. My FP informed my obstetrician of my health status, laboratory test results, etc. (by means of a letter, a telephone call, etc.).	0.416		
	4. After I went to the obstetrician, my FP asked me about this visit and the obstetrician's explanations.	0.813		
	5. My FP helped me to understand the explanations, examinations and laboratory tests of the obstetrician.	0.756		
	6. My FP was aware of all my visits to other health centers or physicians.	0.820		
<b>4) Coordination of care by FHWs</b>	1. After I went to the obstetrician, my FHW asked me about this visit and the obstetrician's explanations.	0.862	10.6	0.9
	2. My FHW helped me to understand the explanations, examinations and laboratory tests of the obstetrician.	0.804		
	3. My FHW was aware of all my visits to other health centers or physicians.	0.814		
<b>5) FPs as first point of contact</b>	1. When I had a new health problem, I visited my FP first.	0.904	8.2	0.9
	2. When I had a problem which required me to see a doctor on the same day, such as pain, fever or extreme vomiting, I visited my FP first.	0.885		
<b>6) Recognising determinants of health</b>	1. My FP was aware of my problems affecting my health and related to my family, neighbourhood and work.	0.695	5.8	0.6
	2. My FHW was aware of my problems affecting my health and related to my family, neighbourhood and work.	0.783		

FP = Family Physician; FHW = Family Health Worker

extent to which FPs providing services in a complex health system can coordinate antenatal care. An evaluation of the psychometric features of the 6 factor, 28 item scale which was developed produced successful results.

Studies conducted in different countries show that it is common for pregnant women to use many service providers simultaneously [8,30]. Another study, conducted in the same region with the present

study in the year 2000 [13], have reported that pregnant women use many care providers simultaneously, and highlighted the need for coordination. The results of the present study, conducted in Bornova with the aim of developing a scale, demonstrate that the coordination problems of the family health model also present themselves in prenatal care services. Only one woman in every twenty interviewed stated that her FP had always informed her obstetrician of her health



status and test results. This item, with a mean of 1.48, was the item with the lowest mean on the scale. Two studies evaluating the family health model in Turkey reported lack of coordination as one of the main problems of the system, support these findings [16,17].

A study evaluating women's levels of satisfaction with primary care services in Turkey [31] measured coordination with 5 items on a four-point Likert scale (4=very satisfied, 3=somewhat satisfied, 2=somewhat dissatisfied, 1=very dissatisfied) and a mean item score of 3.3 was calculated. Another study in Canada, examining primary care reforms, measured the level of coordination between the PCP and specialist using seven items [32]. Following the reforms, a mean item score of 3.15 ( $\pm 0.04$ ) was calculated (1=definitely not, 2=probably not, 3=probably, 4=definitely). In comparison with these two studies, it can be said that the level of coordination found in the Bornova study was quite insufficient.

The scale developed in this study not only evaluates the coordination function of FPs and FHWs, but also gives information about the primary care functions of accessibility-comprehensiveness, first point of contact and recognising determinants of health. In the results of the factor analysis, coordination constituted a separate factor by itself, and the other functions which were its prerequisites were grouped into five factors. This gives us the possibility not only of evaluating coordination both independently of other concepts and in a valid way, but also of primary care not losing its integrated approach. When a measure of women's satisfaction with primary care services was evaluated in a study in Turkey [19], care coordination and comprehensiveness constituted a factor together and the distinctiveness of coordination was reduced. In a study evaluating another measure of primary care [20], the first contact utilisation, continuity, cultural competence and coordination functions of primary care providers were grouped into one factor whereas the other factor included the items more related to the primary care centre, telephone-based services and mental health counselling (first-contact accessibility, continuity and comprehensiveness of primary care).

Another important feature of the scale developed in the present study is the separate treatment of the concepts of both coordination and accessibility-comprehensiveness relating to FPs and FHWs. In many studies, the evaluation has been of the whole primary care team [19,20] or only doctors [18,21,33]. However, it has been reported in a study evaluating the family medicine model in Turkey that the sharing of responsibility for pregnancy and infant monitoring between FHWs and FPs can take very different forms [16]. While sometimes the majority of the responsibility is taken by FHWs, sometimes the whole process is actively carried out by FPs. In health systems where differences such as these may exist, the separate evaluation of coordination for different providers is a suitable approach.

In a study evaluating primary care relating to children [21], coordination was treated as an independent factor comprised of two items with a Cronbach's alpha coefficient of 0.7. In the present study, the alpha coefficient of this factor was found to be higher (0.8 for FPs and 0.9 for FHWs). The Cronbach's alpha values for the other factors were in accordance with the literature, or higher [18-21]. The percentage of total variance explained by various measures in the literature has been found to be 82% [20], 66% [34] and 54.8%

[19]. Accordingly, it can be said that the scale developed in this study accounts for a relatively good proportion of the variance.

It is necessary to take account of some limitations when evaluating this study. The participants consisted mainly of women with low levels of education and income. Despite this, all of the women stated that in addition to going to their FPs, they had also visited an obstetrician for antenatal care. However, these women did not use a large variety of service providers, which could otherwise make the coordination of services difficult. Therefore, it would be appropriate to administer this scale to a wider sample of women to include those with higher levels of education and income, who are more likely to have the opportunity of using a wide range of service providers at the same time, and to evaluate it according to the results. Another problem may be bias caused by the tendency of women to give the answers wanted. However, as the interviewers were a team independent of primary care services, this is not very likely.

## Conclusion

Most studies in the literature on developing scales evaluating coordination have targeted the general population, or groups with multiple health issues (chronic conditions, multiple morbidities, cancer patients, children with special health care needs and the elderly) [35]. On the other hand, studies evaluating antenatal care have aimed to evaluate the quality of primary care services and the level of satisfaction with these services [16,31,36-38]. Therefore, the scale developed in the present study has the potential to fill a gap in the literature regarding the measurement of coordination of prenatal health services. The results evaluating the scale indicated that the scale had successful psychometric features. However, there is the need for more comprehensive scales, which also evaluate the coordination of prenatal care from the perspectives of health personnel and the health system.

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