

## Screening Tests in Prenatal Care: A National Study in Israel

Rosa Gofin MD MPH, Bella Adler MA and Hava Palti MD MPH

Braun School of Public Health and Community Medicine, Hebrew University and Hadassah University Hospital, Jerusalem, Israel

**Key words:** prenatal care, screening, compliance, barriers, payment

### Abstract

**Background:** Prenatal care in Israel is established as a universal service, but the degree of compliance with care recommendations may vary with the healthcare provider or the characteristics of the population.

**Objectives:** To study referral to and compliance with the performance of ultrasound, alpha-fetoprotein and amniocentesis and the factors associated with them in a national sample.

**Methods:** The sampling frame consisted of women who gave birth during March 2000. The sample included 1,100 Israeli Jewish and Arab women who resided in localities with over 50,000 and 20,000 inhabitants respectively. They were interviewed by phone 3 months after delivery.

**Results:** In both population groups 30% reported having seven or more ultrasounds during pregnancy. The performance of fetal body scans was relatively low. Factors associated with non-performance among Jewish women were: lower education, religiousness, and attending Mother and Child Health services as compared to all other services. Seventy-seven percent of Jewish women and 84% of Arab women reported that they had been referred for alpha-protein tests. For women aged 35 and over, 55% of Jewish women were referred for amniocentesis and 63% complied, whereas 39% of Arab women were referred but none complied.

**Conclusions:** Ultrasound is almost universally performed among Jewish and Arab women, however fetal body scans, alpha-fetoprotein and amniocentesis (for women over the age of 35) are not. The reasons for the lower coverage may be due to under-referral and/or lack of compliance of the women, perhaps due to sociocultural barriers. In both population groups considerable out-of-pocket money is paid for the tests.

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Prenatal care is an integral part of health services provided to all women, whether in the framework of preventive health services or of curative care. In Israel the Mother and Child Health clinics of the Ministry of Health have provided prenatal care since 1916 [1]. Lately, care is increasingly being given by other providers, including private doctors, primary care clinics and women's health clinics in the four health management organizations. Women are also increasingly using this array of services in conjunction with the MCH clinics or instead of them. In Israel the Ministry of Health is the institution that dictates the guidelines for prenatal care wherever they are provided. Screening tests for the early detection of congenital anomalies and other health problems are recommended to pregnant women and are included in the "basket of services" stipulated by the National Health Insurance law [2].

MCH = Mother and Child Health

The recommendations for prenatal care dated 1993 [3] included among others: alpha-fetoprotein, one ultrasound for all pregnant women at around 20 weeks of gestation, and amniocentesis for women older than 35 years. A revision of these recommendations in 2001 [4] includes the performance of one fetal body scan at 16–20 weeks of gestation and ultrasound in the first and third trimester, according to specific indications. The Family Doctors Association of Israel also recommended these tests [5]. These tests are usually included in recommendations from different organizations in different countries. The United States Preventive Services Task Force [6] and the Canadian Task Force for Preventive Health Care [7] assert that there is good evidence to include in prenatal care the alpha-fetoprotein test and amniocentesis for women over the age of 35. However, the performance of serial ultrasound was not recommended in the second and third trimesters as routine in normal pregnancies [7], or as routine in the third trimester [6]. In a comparison of the consistency between seven guidelines for prenatal care in Australia, the United States, Canada and Germany, amniocentesis for women over 35 years appears in three of the guidelines, ultrasound scan in four and alpha-fetoprotein in five [8].

While coverage of prenatal care in Israel can be considered a universal service [9], the degree of adherence to the guidelines and compliance with the recommendations may vary with the healthcare provider and the characteristics of the population. Barriers to compliance have been shown to differ according to accessibility and affordability of the service [10–12], anxiety about the results of the test [12], sociodemographic and behavioral factors [12–14], and time of the first visit [15]. In this paper we present data on compliance and the factors associated with it regarding the performance of ultrasound, alpha-fetoprotein and amniocentesis in a national sample of Jewish and Arab women, as a basis for improvement of the quality of the service and the outcome of pregnancy.

### Methods

Details about the population have been published elsewhere [9]. Briefly, the sample included 1,100 Israeli Jewish and Arab women who resided in localities with over 50,000 and 20,000 inhabitants respectively and gave birth during March 2000. They were interviewed by phone 3 months after delivery. Arab women were younger than Jewish women, 36% and 16% respectively were less than 24 years old, and a higher percentage of them had less than 11 years of education (50% and 14% respectively). The main source of prenatal care was defined according to the women's self-report:

**Table 1.** Reported number of ultrasound examinations performed by main service provider by population group (%)

No. of times	Women's Health Center	HMO and high risk clinic	Independent physicians	Private physician	MCH	Women's Health Center	HMO and high risk clinic	Independent physicians	Private physician	MCH
	Jewish women					Arab women				
	%	%	%	%	%	%	%	%	%	%
0	1	2	1	2	4	–	3	(4)	(0)	6
1-3	33	33	30	14	38	–	16	(40)	(0)	60
4-6	35	37	40	22	39	–	29	(20)	(17)	25
7+	32	28	30	62	20	–	52	(36)	(83)	9
Total %	100	100	100	100	100	–	100	(100)	(100)	100
n	95	233	169	50	114	–	38	(25)	(12)	114
P	0.001					0.001				

clinics of the four HMOs (Clalit, Maccabi, Meuhedet and Leumit Health Services), MCH clinics, women's health centers, high risk clinics, independent physicians (employed by the HMO but attending in their own clinics), and private physicians.

Data were analyzed by SPSS [16]. To study the unique contribution of the independent variables that were associated with the performance of ultrasound or alpha-fetoprotein, logistic regression was performed and presented as odds ratios and 95% confidence intervals. Alpha = 0.05 was considered significant.

The information reported by Jewish women was validated by reviewing 144 records at the clinic considered by the women as the main service provider clinics (except for one of the HMOs). Agreement of 97% for performance of ultrasound, 98% for alpha-fetoprotein and 86% for amniocentesis was noted. No parallel information is available for Arab women due to technical difficulties.

**Results**

**Ultrasound**

Nearly all women underwent an ultrasound examination during pregnancy (98% of the Jewish and 95% of the Arab women), with 30% in both population groups reporting seven or more during pregnancy. This high frequency was reported by two-thirds of the Jewish women whose main service provider was a private physician [Table 1], but only by 20% of those receiving the care in MCH clinics. Among Arab women about half attending an HMO clinic and 9% of those receiving care in MCH clinics as the main service reported having had seven or more ultrasounds.

Jewish women members of Clalit and Maccabi Health Services reported seven or more ultrasounds (30% and 34% respectively) than those from Meuhedet and Leumit (24% and 26% respectively). The location where the ultrasound scans were performed was determined by the service providing the prenatal care and the availability of equipment; women receiving care at HMO clinics underwent most of the ultrasounds in those clinics. Those receiving care at an MCH clinic, where ultrasound is not available, had the scan at any other service.

Among both Jewish and Arab women, years of education, religiousness, age and number of children, and pathology of pregnancy were not associated with the performance and frequency of ultrasound.

**Table 2.** Performance of fetal body scans by education, religiousness, origin, main service provider and number of pathologic conditions during pregnancy. Logistic regression (Jewish women)

	n	OR	95% CI	P
<b>Education (yrs)</b>				0.000
<11	58	0.28	0.13–0.60	0.001
12	203	1.54	0.86–2.73	0.145
13+	411	1		
<b>Religiousness</b>				0.000
Secular	261	1		
Religious	245	0.07	0.04–0.15	0.000
Traditional	166	0.65	0.27–1.55	0.328
<b>Origin*</b>				0.001
Europe-America	140	1.69	0.90–3.16	0.101
Asia-Africa	269	3.56	1.89–6.69	0.000
Russia	87	1.00	0.43–2.31	0.992
Israel	176	1		
<b>Main service</b>				0.008
MCH	128	1		
Women's health center	96	3.27	1.36–7.88	0.008
HMO	233	1.61	0.84–3.10	0.154
Independent	167	3.69	1.68–8.14	0.001
Private	48	2.53	0.82–7.83	0.107
<b>Pathologic conditions</b>				0.179
None	395	1		
1	196	1.29	0.76–2.17	0.344
2–5	81	2.29	0.89–5.83	0.084

\* Europe-America and Asia-Africa includes Israeli-born women whose father was born in those continents

Despite the high frequency of ultrasound examinations the performance of fetal body scans was lacking. Non-performance ranged from 12% of Jewish women (receiving care at women health centers) to 22% (receiving care at the HMOs and high risk clinics). The percentages among Arab women were even higher: from 21% for those receiving care in HMOs to 32% receiving care in MCH clinics.

The odds ratio of performing a fetal body scan was around four times lower for Jewish women with 11 years of education or less (OR = 0.28) relative to those with 13 years or more [Table 2] and extremely low for religious women (OR = 0.07) relative to secular

HMO = health management organization

OR = odds ratio

**Table 3.** Performance of alpha-fetoprotein test by education, religiousness and source of care in each population group. Logistic regression.

	n	OR	95% CI	P		n	OR	95% CI	P
	Jewish women					Arab women			
<b>Education (yrs)</b>				0.070					0.043
<11	52	0.46		0.067	91	0.26	0.07-0.96	0.043	
12	188	1.27	0.20-1.01	0.394	64	0.61	0.15-2.51	0.492	
13+	348	1	0.73-2.20		39	1			
<b>Religiousness</b>				0.000					0.153
Secular	244	1			28	1			
Religious	181	0.04	0.02-0.07	0.000	76	0.27	0.06-1.27	0.098	
Traditional	163	0.97	0.46-2.05	0.937	90	0.49	0.10-2.45	0.385	
<b>Main service</b>				0.729					0.415
MCH	117	1			102	1			
HMO*	286	0.91	0.47-1.73	0.762	58	0.66	0.28-1.57	0.347	
Independent	145	1.24	0.58-2.65	0.586	23	1.37	0.28-6.75	0.702	
Private	40	1.30	0.41-4.14	0.661	11	0.37	0.09-1.50	0.163	
<b>Origin**</b>				0.293					
Europe-America	112	1.45	0.75-2.93	0.257					
Asia-Africa	252	1.81	0.98-3.34	0.058					
Russia	82	1.30	0.55-3.08	0.547					
Israel	142	1							

\* Includes women's health center and high risk clinics

\*\* Europe-America and Asia-Africa includes Israeli-born women whose father was born in those continents

women. The odds ratio of having a fetal body scan was greater for women attending all other services as compared to MCH services. Women's origin remained significantly associated to the performance of fetal body scans but the presence of pathologies during pregnancy was not. Among the Arab women no association was found with the performance of fetal body scans according to education or religiousness.

#### Alpha-fetoprotein

Seventy-seven percent of Jewish women and 84% of Arab women reported having been referred for alpha-protein tests. Regardless of whether they were referred or not, 63% and 84% respectively had the tests. Among Jewish women there were no differences in performance by the service most utilized, whereas among Arab women this test was done in 92% of those attending the physician's office and in only 78% of those attending HMO clinics ( $P = 0.019$ ). Education and religiousness were also associated with the performance of alpha-fetoprotein.

In order to characterize the women who complied with the performance of alpha-fetoprotein test we conducted a logistic regression. The OR of performance of alpha-fetoprotein test among Jewish women [Table 3] was especially low for religious as compared to secular women (OR = 0.04). Among Arab women the only variable that remained significantly associated with performance of alpha-fetoprotein in the logistic regression analysis was education. The association with the service most utilized was not significant in both population groups.

#### Amniocentesis

Among Jewish women aged 35 and over (for whom amniocentesis is recommended by the Ministry of Health and is included in the "basket of services") 55% reported having been referred and 63% of

them complied. However, among the 39% of Arab women aged 35 and older who were referred none complied. There were no differences in the performance of amniocentesis by education in either age or population group. Religiousness was associated with performance of amniocentesis only among Jewish women 35 years and older: 77% of secular, 68% of traditional and 35% of Orthodox women ( $P = 0.001$ ) reported that they complied. Twenty percent of Jewish women and 19% of Arab women under the age of 35 reported being referred to amniocentesis; among them 25% and 9% respectively complied with the referral.

#### Out-of-pocket payment

Nineteen percent of Jewish women reported paying for the ultrasound compared to 10% among Arab women, which varied according to the service utilized – ranging from 4% among those receiving care in independent physician offices to 79% getting care from private physicians. For Arab women it ranged from 2% among those getting care in HMOs and independent physician offices to 86% among those attended by private physicians. Jewish women paid between 15 (\$3.75) and 4,900 shekels (\$1,225) for the ultrasound while Arab women paid less, 20-300 shekels (\$5-\$75). Additional amounts were paid for fetal body scans, varying from 15 to 4,200 shekels (\$3.75-\$1,050) among Jewish women and 15 to 1,000 shekels (\$3.75-\$250) for Arab women.

Alpha-fetoprotein was paid by 64% of the Jewish women and 79% of the Arab women: up to 45 shekels (\$11) were paid by 48% of the Jewish women and by 23% of the Arab women.

Among the 147 Jewish women who underwent amniocentesis, 51% reported out-of-pocket payment of 400-3,600 shekels (\$100-\$900). Only 3 of 241 Arab women reported paying for the amniocentesis and they paid much lower amounts, 20-160 shekels (\$5-\$40).

## Discussion

This study comprised a national sample of Jewish and Arab women living in urban areas with more than 20,000 inhabitants. Validation of the information reported by Jewish women is high. It indicates that there is no recall bias regarding the tests' performance. Reports from the literature indicate that there is high validity for examinations that are performed almost exclusively during pregnancy, such as ultrasound and amniocentesis [17].

The present study indicates a varied performance of selected prenatal screening tests. The recommendations of the Ministry of Health and the basket of services provided by the National Health Insurance Law [2] include the performance of prenatal tests such as alpha-fetoprotein and ultrasound for all pregnant women, and amniocentesis for those aged 35 or older. However, the reported performance of those prenatal tests in the urban Israeli population is diverse. A clear trend for medicalization of pregnancy has been evident, stemming from advances in technology and demands by the patients. Women undergo many tests during pregnancy and those presented in this paper are but a sample. Nevertheless, while ultrasound is almost universally performed, the other tests are performed to a lesser extent. A relatively low performance of the latter tests was also shown in a study of Jewish women giving birth in 27 hospitals in Israel [18]. Possible reasons for the disparities in performance may be due to structural or attitudinal factors related to the healthcare provider or to the pregnant women themselves. Regarding health providers, the separation of preventive and curative care as it prevails in Israel may lead to uneven use of these services. The MCH clinics provide only preventive care, whereas for most tests there is need for laboratory or specialized services, which are supplied by other providers. This may lead to women using several concomitant health services during pregnancy [9] in order to receive advice and to undergo all tests and examinations. As a result there is a fragmentation of services and a lack of coordination between the different providers, with no service or professional taking responsibility for the overall follow-up of the women. Consequently, providers may overlook referrals due to short consultation time, difficulties in communication with patients, or no clear guidelines in each of the services. Under these conditions there is potential for disregarding the basic recommendations for appropriate care and the over-utilization of tests such as ultrasound. In our study the lack of performance of fetal body scans was related to both the service attended by the women and their sociodemographic background, but not to the presence of pathologies during pregnancy. A common record carried by the patient herself, or the decision of the woman and her partner to take responsibility for her care and the tests that should be performed may compensate for this fragmentation.

With regard to the attitudes of professionals, they may be influenced by their assumptions about the women's compliance with further action after a screening test (i.e., performance of abortion) or by slants on the part of the professionals themselves. This in turn can affect their decision on providing referral or advice to undergo screening tests. This might have been the reason why not all women were referred for alpha-protein tests or those aged 35 or older were not referred for amniocentesis. Lack of universal

referral has also been reported, mainly among Jewish Israeli religious women [18].

With regard to the women's beliefs and attitudes, these may be influenced by the type of screening. While ultrasound is a non-invasive examination and provides women with a tangible image of the pregnancy, this is not the case with alpha-fetoprotein or amniocentesis. The performance of alpha-fetoprotein or amniocentesis is based on the premise that in the event of a pathologic result, an abortion is indicated. However, since in some population groups abortion is not acceptable, performance of the test may be superfluous and is therefore not practiced. This was evidenced by the strong association of religiousness with the performance of alpha-fetoprotein among Jewish women; this has been confirmed among Jewish Israeli women [18], 67% of whom reported that they did not perform the triple test and 53% of women aged 35 years and older did not undergo amniocentesis on moral and religious grounds. Among Arab women, the association with low education may be an expression of the influence of traditional values against abortion. Studies have shown that Arab women do not undergo prenatal testing for knowledge and assurance [19], but they would perform an abortion if the outcome is considered severe or if the diagnosis is made early in the pregnancy [20,21]. Another possible explanation for the differentially reported performance of tests could be the selective recall of women.

Payment for the tests does not seem to be an obstacle to their performance. The HMOs reimburse at least one ultrasound, while the others are allowed according to the patient's medical condition. Although the tests reported in this paper are included in the basket of services, some services require co-payment. In addition, considerable sums are paid by the women for the basic services recommended by the Health Ministry, such as amniocentesis for women over age 35. The affordability and willingness to pay for these tests may vary among the population groups. Although this was not specifically studied, differences in the amounts paid by Jewish and Arab women may indicate different practices by the providers, mainly private physicians and institutions supplying prenatal screening, and by the women themselves, in their approach to care and in the affordability of services beyond the ones routinely provided. However, differential recall regarding the amounts paid cannot be ignored.

## Conclusion

Ultrasound is nearly universally performed among Jewish and Arab women, while fetal body scans, alpha-fetoprotein and amniocentesis (for women over age 35) are not, possibly due to under-referral on the part of the provider and/or lack of compliance of the women, perhaps due to sociocultural barriers. For both population groups, considerable out-of-pocket money is paid for the basic tests recommended by the Ministry of Health – tests that are free of charge, since they are included in the "basket of services" to which every pregnant woman as a citizen of Israel is entitled.

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**Correspondence:** Dr. R. Gofin, Braun School of Public Health and Community Medicine, P.O. Box 12000, Jerusalem 91120, Israel.  
Phone: (972-2) 677-7502  
Fax: (972-2) 643-1086  
email: gofin@cc.huji.ac.il

## Capsule

### Eat less, live longer

Health problems in the elderly are thought to result from the cumulative effects of cell loss over time. Caloric restriction and genetic manipulations that extend life-span typically reduce stress-induced apoptotic cell death. In yeast, caloric restriction increases life-span by activating the Sir2 deacetylase. Cohen et al. now find that mammalian Sir2 (SIRT1), a regulator of cell defenses, is induced in calorically restricted rats and in human

cells treated with serum from these animals. One way in which caloric restriction extends mammalian life-span may be by increasing SIRT1 expression and thus the survival of key cells.

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E. Israeli

## Capsule

### Molecular evolution of influenza

The inclusion of antigenic data in the analysis of virus evolution is crucial because virus evolution is generally thought to be driven by antigenic properties. Smith et al. examined 35 years of antigenic evolution of influenza A virus, subtype H3N2, from the 1968 pandemic until 2003. By comparing and contrasting the antigenic evolution of influenza virus with its genetic evolution, they show that antigenic evolution is clustered, whereas genetic evolution is continuous. The authors are also able to calculate

the antigenic effect of amino acid substitutions in the hemagglutinin gene of influenza. This method can be applied to the development of diagnostics, surveillance policies, and vaccines for a variety of antigenically variable pathogens.

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