



## NEWS

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Pregnancy Outcome and the Kessner Index  
Monthly Statistical Summary

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### PREGNANCY OUTCOME AND THE KESSNER INDEX

The Kessner Index (KI) measures the adequacy of prenatal care. In the early 1970's, David Kessner demonstrated a relationship between pregnancy outcome and a three-factor health service index that used the timing of the first prenatal visit, the total number of prenatal visits, and the type of hospital service where delivery occurred. Women with adequate care based upon this index delivered infants with better birthweights and better survival rates than women who had intermediate or inadequate care. The relationship held true in every risk category and ethnic group Kessner examined.<sup>1</sup> The Kessner Index presently in use substitutes gestational age of the infant for the type of hospital delivery service. Adequate, intermediate, and inadequate care are defined in Table 1.

**Table 1. The Kessner Index**

Care category	Initial visit	Gestational age	# of prenatal visits
Ade-quate	1st trimester &	≤13 weeks	≥1
		14-17 weeks	≥2
		18-21 weeks	≥3
		22-25 weeks	≥4
		26-29 weeks	≥5
		30-31 weeks	≥6
		32-33 weeks	≥7
		34-35 weeks	≥8
		≥36 weeks	≥9
Inad-quate	3rd trimester or	14-21 weeks	0
		22-29 weeks	≤1
		30-31 weeks	≤2
		32-33 weeks	≤3
		≥34 weeks	≤4
Intermediate	any combination not included in the above		

Note that a woman must begin prenatal care during the first trimester of pregnancy (≤13

weeks) to have adequate care, regardless of the number of visits. Likewise, if prenatal care began during the third trimester, it is inadequate regardless of the number of visits.

Out of a total of 301,827 live births in Texas during 1987, 53.0% were born to women with adequate care; 27.9%, to women with intermediate care; 16.1%, to those with inadequate care, and 3.0% were missing data needed to calculate the KI. (Births with missing data were excluded from the analysis, leaving a total of 292,799 live births as the base for all other calculations.) The effect of adequacy of care on the pregnancy outcome of birthweight can be seen in Table 2.

**Table 2. Birthweight by Kessner Index, Texas resident births, 1987.**

Birth-weight	KI:		
	Ade-quate	Inter-mediate	In-adequate
≤ 5lb 8 oz	5.7%	8.2%	9.6%
5lb 9oz-9lb 14oz	92.6	90.2	89.3
≥ 9lb 14 oz	1.8	1.4	1.1

Seven percent of live births that occurred during 1987 were low birthweight (corresponding to the ≤5lb 8oz category). A smaller percentage of these low birthweight infants were born to women with adequate prenatal care than to women with either intermediate or inadequate care. Women with adequate care had a greater percentage of normal and heavy weight babies compared to women with inadequate prenatal care. Adequacy of prenatal care is obviously an important determinant of good pregnancy outcome. This implies that maternity services should not only encourage women to begin prenatal care early in pregnancy, but should also take steps to ensure that women remain in care throughout pregnancy.

When the KI is examined by maternal characteristics, women at higher risk for poor pregnancy outcomes have higher percentages of inadequate



care. For example, teenagers are at higher risk for poor pregnancy outcome than women 20-34 years old. While teens accounted for only 15.1% of all births, at least two thirds of them did not receive adequate prenatal care (Table 3). This contrasts with the 20- to 34- year old category, where over half the women received adequate prenatal care. Almost two thirds of women 35 years old and over obtained adequate prenatal care. It is assumed that women in this category, although high risk because of age, are often (but not exclusively) better educated and of higher socioeconomic status than the other age groups, and thus, more likely to avail themselves of medical services.

**Table 3. Percent Kessner Index by maternal age, Texas resident births, 1987**

Maternal age	%*	KI:		
		Ade-quate	Inter-mediate	Inad-equate
≤15 years	1.4	24.2%	45.5%	30.3%
16-17 years	4.9	29.1	43.2	27.7
18-19 years	8.8	33.9	40.0	26.2
20-34 years	78.7	58.5	26.7	14.9
≥35 years	6.3	62.6	24.5	12.9

\* percentage of total (292,799) live births.

When examined by ethnicity, almost two thirds of Anglo women giving birth in 1987 obtained adequate care compared to less than half the African-American and Hispanic women (Table 4). Only a tenth of Anglo women had inadequate care versus one fifth of all African-American women and one quarter of Hispanic women. Since African-American and Hispanic women accounted for slightly less than half the births in Texas during 1987, a large proportion of pregnant women did not obtain an adequate amount of prenatal care.

What the maternal age and ethnicity examples demonstrate is that inadequate care, by itself a risk factor for poor pregnancy outcome, interacts with other factors that place a woman at risk for poor pregnancy outcome. These examples suggest that women who are already at risk for poor outcome have difficulty entering prenatal care at an appropriate time and staying in prenatal care until delivery. The challenge for the health care system is not only to identify these high-risk

women, but also to bring them into the health care system as consistent and regular users of health services.

**Table 4. Percent Kessner Index by ethnicity, Texas resident births, 1987**

Ethnicity	%*	KI:		
		Ade-quate	Inter-mediate	Inad-equate
Anglo	54.4	66.1%	23.0%	10.9%
African-American	14.0	44.1	35.7	20.2
Hispanic	31.6	39.7	35.5	24.8

\*percentage of total (292,799) live births.

The Kessner Index is not flawless. It does not take into account the risk status of the mother; a high risk mother may need more than the "adequate" number of visits. The KI does not measure quality and content of prenatal care; if the care is lacking in a qualitative sense, an appropriate number of visits may not be worthwhile. Lastly, the index is only as good as the data collected on the birth certificates, which is the standard source of data used to calculate the KI. Inaccuracies in data gathering and/or recording, particularly for the number of prenatal visits, will adversely affect the calculation of the KI and, subsequently, analyses of the data (such as those included in this article) and implementation of services based upon those analyses. Therefore, it is imperative that data entered onto the birth certificates be accurate.

Despite its flaws, the Kessner Index remains an excellent tool for health service evaluation. As the examples illustrate, a Kessner Index of less than adequate prenatal care is associated with high risk conditions (eg, maternal age and ethnicity) as well as pregnancy outcome (eg, birthweight). Thus, the Kessner Index is useful as both an **intermediate** (dependent) variable and as a **predictor** (independent) variable for epidemiologic evaluation of maternal and infant health status and services.

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REFERENCE:

1. Kessner D, et al. Summary. In: Infant death: an analysis of maternal risk and health care. Washington, DC: National Academy of Sciences, Institute of Medicine, 1973:13-8.

MONTHLY SUMMARY OF REPORTABLE DISEASES IN TEXAS

(Counties listed below reflect only those with populations of 190,000 or more, based on 1988 population estimates.)

Cumulative through: JUNE, 1989

County	Amebiasis	Campylobacteriosis	Chickenpox	ENCEPHALITIS	Influenzae Infections	Hepatitis A	Hepatitis B	Hepatitis HA-HB	Influenza	Measles	Meningococcal Infections	Aseptic Meningitis	Mumps	Pertussis	Rubella	Salmonella	Shigella
BEXAR	1	68	736	1	52	124	92	5	2386	39	2	41	4	7	0	61	98
BRAZORIA	0	0	17	0	0	5	6	0	38	12	2	2	1	0	0	1	2
CAMERON	13	2	412	2	9	35	4	0	2699	45	1	2	21	0	1	9	21
COLLIN	0	2	1004	0	1	22	7	0	14822	2	1	3	1	0	1	11	14
DALLAS	8	38	4382	1	71	178	137	8	13234	118	13	33	18	4	1	94	95
DERTON	0	7	36	0	7	9	2	0	589	1	0	3	0	3	0	4	2
EL PASO	0	3	735	0	4	127	56	2	150	0	0	2	4	1	1	42	15
FORT BEND	0	4	55	0	3	2	6	0	22	6	0	2	2	0	0	7	7
GALVESTON	0	4	137	0	5	27	10	0	122	2	2	8	0	0	0	5	2
HARRIS	5	27	3916	5	42	242	58	12	18428	1513	9	77	45	2	1	63	53
HIDALGO	3	8	289	1	3	14	6	1	19	307	5	0	4	0	0	22	30
JEFFERSON	0	3	342	0	5	27	19	4	677	0	3	3	186	0	0	15	15
KLUBBCK	15	3	202	0	12	10	26	4	331	310	2	6	4	1	8	27	13
MCCENHAN	0	0	373	0	3	47	6	3	968	0	0	1	0	0	0	4	5
MONTGOMERY	0	1	85	0	1	24	9	1	4	20	0	2	3	0	0	4	0
MUEBES	2	2	783	0	9	13	14	0	3325	28	0	7	0	0	0	16	25
TARRANT	2	8	1829	2	26	92	87	1	4849	35	11	19	4	16	4	53	31
TRAVIS	12	30	108	0	14	33	24	2	53	8	0	13	3	1	0	39	32
All Other Counties	16	53	4305	11	166	601	274	11	18966	371	22	44	134	20	13	235	165
Cumulative TX 1989	77	264	19664	23	433	1632	843	54	73682	2837	73	268	434	55	30	722	625
Cumulative Tx 1988	128	332	15601	42	452	1079	723	79	81011	11	56	268	135	103	6	867	1364

1989 CUMULATIVE TOTALS FOR OTHER REPORTABLE DISEASES:

Acute Occ. Pesticide Poisoning	5	Coccidioidomycosis	18	Histoplasmosis	25	Psittacosis	0	Toxic Shock Syndrom	7
Anthrax	0	Dengue	0	Legionellosis	4	Q Fever	0	Trichinosis	0
Asbestosis *	0	Diphtheria	0	Leptospirosis	0	Rabies	0	Tuberculosis	814
Botulism	2	Elevated Blood Lead Levels	461	Listeria Infections	11	Reye Syndrome	0	Tularemia	0
Brucellosis	11	Gonorrhea	21862	Lyme Disease	18	Rocky Mt Spotted Fever	1	Typhoid	7
Chlamydia trachomatis	7358	Hansen's Disease	13	Malaria	26	Silicosis *	1	Typhus, Murine	1
Cholera	0	Hepatitis D (Delta Agent)	6	Plague	0	Syphilis (P&S)	1809	Vibrio Infections	1
		Hepatitis type unspecified	294	Polioyaelitis	0	Tetanus	1	Yellow Fever	0

\* Blood lead level >40ug/dl in persons 15 years of age or older; summarized by date of blood lead test.

TEXAS DEPARTMENT OF HEALTH  
 TEXAS AIDS CASES: WEEKLY SURVEILLANCE REPORT  
 Case County by Residence of Onset and Year of Diagnosis  
 July 14, 1989

COUNTY	1980-1985		1986		1987		1988		1989		CUMULATIVE	
	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths
Bell	3	3	4	2	2	1	2	2	1	0	12	8
Bexar	53	50	56	49	114	81	174	52	87	18	484	250
Bowie	1	1	2	2	6	4	9	7	1	0	19	14
Brazoria	8	8	10	7	9	2	10	3	1	0	38	20
Brazos	10	10	5	4	4	4	2	1	2	0	23	19
Cameron	1	1	3	1	1	1	4	2	4	2	13	7
Collin	1	1	2	2	5	3	3	3	1	1	12	10
Dallas	250	239	305	249	495	334	481	197	167	31	1698	1050
Denton	2	2	6	5	16	14	10	5	3	0	37	27
Ector	1	1	4	4	4	3	6	1	0	0	15	9
Ellis	0	0	1	1	6	5	4	3	1	0	12	9
El Paso	5	5	9	9	19	8	15	6	10	4	58	32
Fort Bend	10	10	10	8	16	9	5	3	5	0	46	30
Galveston	11	11	16	14	22	12	21	7	12	3	82	47
Gregg	2	2	3	3	5	4	1	1	0	0	11	10
Harris	610	557	622	529	813	494	712	293	171	33	2928	1906
Hays	3	3	4	4	2	1	1	1	0	0	10	9
Hidalgo	6	6	0	0	4	3	2	0	2	0	14	9
Jefferson	7	6	8	3	20	10	18	10	4	0	57	29
Johnson	1	1	1	1	3	1	6	2	1	1	12	6
Lubbock	4	4	5	3	15	11	7	2	4	1	35	21
McLennan	2	2	6	4	6	3	3	1	0	0	17	10
Midland	1	1	0	0	6	4	4	0	0	0	11	5
Montgomery	5	5	3	2	9	6	13	8	3	2	33	23
Nueces	6	4	11	9	20	14	14	3	10	3	61	33
Orange	3	3	4	2	4	3	3	2	3	3	17	13
Potter	1	0	3	2	5	3	6	4	2	1	17	10
Smith	3	3	3	1	3	1	4	1	3	1	16	7
Tarrant	44	37	50	33	125	82	95	38	34	9	348	199
Taylor	3	3	2	2	1	1	9	4	4	1	19	11
Travis	60	50	53	37	105	62	111	36	35	6	364	191
Walker **	9	9	19	11	19	9	26	4	16	1	89	34
Webb	1	1	4	4	5	1	5	2	0	0	15	8
Wichita	1	1	2	1	6	4	12	2	0	0	21	8
Williamson	0	0	3	3	4	2	1	0	3	0	11	5
All Others	43	37	53	41	98	65	86	31	17	2	297	176

STATEWIDE	1980-1985		1986		1987		1988		1989		CUMULATIVE	
	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths
	1171	1077	1292	1052	1997	1265	1885	737	607	123	6952	4255
CFR %	CFR%	92	CFR%	81	CFR%	63	CFR%	39	CFR%	20	CFR%	61

\* COUNTIES LISTED INDIVIDUALLY ARE THOSE WITH A CUMULATIVE TOTAL OF 10+  
 \*\* 80 CASES WERE DIAGNOSED WHILE TEXAS DEPARTMENT OF CORRECTION INMATES

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