

Factors associated with successful pregnancy outcomes in Upper Egypt: A positive deviance inquiry

Mahshid Ahrari, Attallah Kuttub, Samir Khamis, Amal Ali Farahat, Gary L. Darmstadt, David R. Marsh, and F. James Levinson

Abstract

A positive deviance inquiry was conducted in Al-Minia, Upper Egypt, to identify factors associated with achievement of good pregnancy outcomes despite limited resources. As compared with women with poor weight gain (n = 30), low-income women with weight gain greater than 1.5 kg per month in the second trimester of pregnancy (n = 11) were more likely to report multiple antenatal care contacts (80% versus 43%), increased rest during pregnancy (67% versus 7%), and more consumption of meat (33% versus 13%) and vegetables (82% versus 37%), and were less likely to report symptoms consistent with urinary tract infection (50% versus 90% with dysuria and 0% versus 57% with cloudy or reddish urine). Similar characteristics distinguished low-income women in a more economically advantaged community whose newborns weighed more than 3 kg (n = 18) as compared with mothers of smaller newborns (n = 18). These characteristics were similar to those identified in the National Research Center's Al-Minia birthweight study. The positive deviance inquiry is an affordable, participatory step to identify accessible individuals, behaviors, and conditions for improved perinatal health.

Introduction

In most communities throughout the world, the uncommon behaviors of a few insightful, enterprising "positive deviant" individuals enable them and their families to find more effective solutions to pervasive problems than their neighbors with whom they share the same resource base. The positive deviance approach

is based on the belief that solutions to community problems that are identified within the community itself are more likely to be effective, affordable, acceptable, and sustainable. A positive deviance inquiry [1] attempts to identify rapidly and at low cost those uncommon practices, linked to a good outcome, that a follow-up program can help spread throughout the community to improve the outcome of interest. Typically, the positive deviance inquiry team and community key informants stratify the population into four groups based on outcome (good versus not good) and risk (higher versus lower). Those at higher risk who demonstrate the good outcome are the positive deviants.

The positive deviance concept was first applied to nutrition in the late 1980s by Zeitlin et al., who observed that most low-income communities included a few poor households with well-nourished children, thus raising the question of how such households could do this when their neighbors could not [2]. Since then, Save the Children Federation/US has applied the positive deviance approach to rehabilitate malnourished children in multiple settings [3, 4]. Save the Children recently declared a Positive Deviance Initiative to affirm its commitment to the approach and to apply it to new programming contexts [5].

Pregnancy outcomes in Egypt are suboptimal. The national rate of low birthweight (10%) is probably an underestimate because of the practice of weighing newborn infants with heavy coverings. Moreover, almost one in three infants (30%) weigh less than 3 kg at birth, and infants weighing 2,500 to 2,999 g at birth are 2.5 times more likely to die than those with birthweights of 3,000 to 3,499 g [6]. It is also likely that low birthweight contributes to the high rates of moderate and severe malnutrition (< -2 SD), affecting an estimated 45% of children under the age of two years in Al-Minia Governorate in Upper Egypt.* Save the Children has used the positive deviance approach

Mahshid Ahrari, Attallah Kuttub, Samir Khamis, Amal Ali Farahat, Gary L. Darmstadt, and David R. Marsh are affiliated with Save the Children Federation in Westport, Connecticut, USA. Dr. Darmstadt is also affiliated with the Department of International Health, School of Hygiene and Public Health, the Johns Hopkins Medical Institutions, Baltimore, Maryland, USA. Dr. Levinson is affiliated with the School of Nutrition Science and Policy, Tufts University, Medford, Massachusetts, USA.

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successfully to reduce child malnutrition in Egypt since 1997.

With the objective of intervening against childhood malnutrition at its root cause, Save the Children applied the positive deviance inquiry to pregnancy outcomes in Al-Minia to identify key behaviors associated with improved pregnancy weight gain and birthweight.

Methods

Save the Children conducted this positive deviance inquiry in its program area in Al-Minia Governorate between June and November 2000 in two large rural communities, Al-Ghatousha and Etsa-Albalad. Outcomes included pregnancy weight gain in Al-Ghatousha and birthweight in Etsa-Albalad [7]. Save the Children mobilized women to participate in both communities, and health clinic staff obtained outcome measurements. Determination of pregnancy weight gain involved monthly weighing sessions on standard bar scales between the fourth and seventh months of pregnancy. Birthweights over the same three-month period were obtained in Etsa-Albalad within 48 hours of delivery on Samson coil scales. "Good outcomes" were an average monthly weight gain over the two-month period of more than 1.5 kg, excluding cases of edema; or birthweight greater than 3.0 kg. "Not good outcomes" were an average monthly weight gain of less than 1 kg and birthweight less than 3.0 kg. We also measured women's height as a possible indicator of lifetime health and nutritional well-being.

Security regulations in Al-Minia precluded household surveys but permitted group interviews. Thus, two months after the weight and height measurements were completed, trained fieldworkers interviewed individual women, one at a time, as they sat in groups of 11 to 24. During these group interviews, information was sought about demographics, use of antenatal care, water and sanitation, symptoms of possible urinary or reproductive tract infection, pregnancy workload, exposure to tobacco, and diet. Because confidentiality was impossible, sensitive topics were avoided. The variation in the responses suggested that the group did not unduly influence individual respondents.

A group of senior village officials estimated economic status and categorized families into classifications that enabled us to divide women with good outcomes into higher- and lower-income subgroups across variables that seemed to be important contributors to good outcome. On the same day and on the day after the survey, we conducted three focus group discussions in each community, one each with low-income positive deviant women, their husbands, and their mothers-in-law to understand better the quanti-

tative findings. We posed questions in English through an Arabic translator and made hand-written notes. We assumed that wide differences in characteristics were likely to be programmatically important without the need for statistical tests.

Results

Pregnancy weight gain in Al-Ghatousha

The total sample of 74 women gained an average of 1.08 kg per month (range, -1 to 2.8 kg). The sample for the positive deviance inquiry included 30 (41%) "poor gainers" who gained less than 1 kg/month and 24 (32%) "good gainers" who gained at least 1.5 kg/month. Eleven (46%) good gainers were positive deviants, i.e., low-income. We followed the good and the poor gainers from similar points in their gestations (20.8 and 20.9 weeks, respectively).

Overall, the women in both weight-gain groups were similar in height, age, age at marriage, age at first pregnancy, and time between the last two pregnancies (table 1). None of the women worked outside the home. Good gainers reported fewer pregnancies than poor gainers (3.0 versus 3.8), were less likely to have a low income (46% versus 80%), and were more likely to have had some schooling (29% versus 13%). Good gainers overall and low-income good gainers were nearly twice as likely as poor gainers to report multiple antenatal care contacts (83%, 80%, and 43%, respectively). Good gainers and the low-income subset were more likely to use tap water than the poor gainers (38%, 18%, and 0%, respectively). Poor gainers were likely to have dysuria than good gainers (90% versus 50%) and reported cloudy or reddish urine far more often (57% versus 0%).

Good gainers overall and low-income good gainers were 10 times as likely as poor gainers to rest more during pregnancy (63%, 67%, and 7%, respectively). On the other hand, both good and poor gainers reported eating less overall during pregnancy (70% versus 77%). However, good gainers overall and low-income good gainers were more likely than poor gainers to eat more meat (57%, 33%, and 13%, respectively) and vegetables (57%, 82%, and 37%, respectively). Consumption of dairy products and vegetable oil was more common among good gainers (22% and 11%, respectively) than among poor gainers (0% and 0%, respectively). On the other hand, poor gainers consumed more beans than good gainers (20% versus 4%).

Birthweight in Etsa-Albalad

We recorded 66 birthweights (mean, 3.00 kg; range, 2.00–3.50 kg). Only one baby weighed less than 2.5 kg,

TABLE 1. Characteristics of pregnant women according to amount of midpregnancy weight gain in Al-Ghatousha

Characteristic	Weight gain (kg/mo)			Likely important differences
	> 1.5 (n = 24)	> 1.5 (low-income subgroup) (n = 11)	< 1.0 (n = 30)	
Mean height (cm)	154.5	155.4	152.8	
Low income—%(no.)	45.8 (11/24)		80 (24/30)	X
Mean age (yr)	24.0		24.8	
Mean age at marriage (yr)	17.3		16.6	
Mean age at 1st pregnancy (yr)	18.0		18.2	
First pregnancy—%(no.)	33 (8/24)		17.2 (5/29)	
Mean gravidity	3.0		3.8	X
Mean interval between last two pregnancies (mo)	38.9		36.4	
Any schooling—%(no.)	29.2 (7/24)	18.2 (2/11)	13.3 (4/30)	X
Out-of-home employment—%(no.)	0 (0/24)		0 (0/30)	
≥ 1 antenatal visit—%(no.)	100 (24/24)	100 (11/11)	70.0 (21/30)	X
≥ 3 antenatal visits—%(no.)	83.3 (20/24)	80.0 (8/10)	43.3 (13/30)	X
Tap water—%(no.)	37.5 (9/24)	18.2 (2/11)	0 (0/30)	X
Latrine—%(no.)	83.3 (20/24)	66.7 (6/9)	63.3 (19/30)	
Painful urination—%(no.)	50 (12/24)		90.0 (27/30)	X
Cloudy or reddish urine—%(no.)	0 (0/24)		56.7 (17/30)	X
Nonwhite vaginal discharge—%(no.)	0 (0/24)		6.7 (2/30)	
Vaginal discharge with unpleasant odor—%(no.)	9.5 (2/21)		13.3 (4/30)	
More than usual rest with pregnancy—%(no.)	62.5 (15/24)	66.7 (6/9)	6.7 (2/30)	X
Pregnancy daytime rest > 90 min/day—%(no.)	62.5 (15/24)	50 (5/10)	33.3 (10/30)	X
Frequent help with chores during pregnancy—%(no.)	54.2 (13/24)		70.0 (21/30)	
Smoking during pregnancy—%(no.)	0 (0/24)		0 (0/30)	
Secondhand smoke exposure during pregnancy—%(no.)	83.3 (20/24)		56.7 (17/30)	
Consumed more food than usual—%(no.)	5.0 (1/20)		6.7 (2/30)	
Consumed less food than usual—%(no.)	70.0 (14/20)		76.7 (23/30)	
Greater than usual consumption of particular foods—%(no.)				
Rice	5.6 (1/18)		0 (0/30)	
Wheat products	16.7 (3/18)	33.3 (3/9)	0 (0/30)	
Meat	55.6 (10/18)		13.3 (4/30)	X
Fish	5.6 (1/18)		0 (0/30)	
Eggs	5.6 (1/18)		0 (0/30)	
Beans	3.9 (7/18)	81.8 (9/11)	20.0 (6/30)	X
Vegetables	55.6 (10/18)		36.7 (11/30)	X
Fruit	61.1 (11/18)		63.3 (19/30)	
Dairy products	22.2 (4/18)		0 (0/30)	X
Oil or fat	11.1 (2/18)		0 (0/30)	X

and 18 (27%) weighed less than 3.0 kg. An additional 18 (38%) of the mothers whose infants had good birthweights were low-income and thus positive deviants. This village was economically more advantaged than Al-Ghatousha (36% versus 62% low-income), and more women had some schooling (82% versus 21%) and access to tap water (79% versus 21%). The women were similar in height, age, age at marriage, age at first pregnancy, gravidity, time between the last two

pregnancies, and schooling, regardless of birthweight outcome (table 2).

In Etsa-Albalad income was not associated with birthweight (38% of mothers of babies of higher birthweight and 33% of mothers of lower birthweight belonged to the low-income subgroup). Mothers of higher-birthweight babies were less likely to be in their first pregnancy than mothers of lower-birthweight infants (25% versus 56%). Mothers of higher-birth-

TABLE 2. Characteristics of pregnant women according to infant's birthweight in Etsa-Albalad

Characteristic	Birthweight (kg)			Likely important differences
	> 3 (<i>n</i> = 48)	> 3 (low-income subgroup) (<i>n</i> = 18)	< 3 (<i>n</i> = 18)	
Mean height (cm)	154.1	152.6	156.3	
Low income—%(no.)	37.5		33.3	
Mean age (yr)	24.0		24.5	
Mean age at marriage (yr)	17.7		18.5	
Mean age at 1st pregnancy (yr)	18.6		19.1	
First pregnancy—%(no.)	25 (12/48)		55.5 (10/18)	X
Mean gravidity	3.1		2.6	
Mean interval between last two pregnancies (mo)	45.9		41.6	
Any schooling—%(no.)	87.5 (42/48)		75 (12/16)	
≥ 3 antenatal visits—%(no.)	81.3 (39/48)	66.7 (12/18)	41.2 (7/17)	X
Cloudy or reddish urine—%(no.)	6.3 (3/48)		50.0 (9/18)	X
More than usual rest with pregnancy—%(no.)	31.3 (15/48)	33.3 (6/18)	16.7 (3/18)	X
Pregnancy daytime rest > 90 min/day—%(no.)	37.5 (18/48)	16.7 (3/18)	25.0 (4/18)	X

weight babies, including those in the low-income subgroup, had more antenatal care visits than mothers of lower-birthweight babies (81%, 67%, and 41%, respectively, had three or more visits). Fewer mothers of higher-birthweight babies reported cloudy or reddish urine than mothers of lower-birthweight babies (6% versus 50%). Finally, mothers of higher-birthweight babies, including the low-income subgroup, were more likely than mothers of low-birthweight babies to report resting more than usual during their pregnancy (31%, 33%, and 17%, respectively). There were no reported dietary differences between the groups (data not shown).

Positive deviance focus groups

Low-income positive deviance women faced more serious time and economic limitations than their economically advantaged neighbors. Nonetheless, they sacrificed to receive antenatal care “to protect pregnancy.” Public services only provided free tetanus immunizations, necessitating visits to private physicians for other aspects of antenatal care; each visit would cost up to one-quarter of their household's monthly income. Women often sold wheat, corn, chickens, or even their jewelry, purchased medicines on credit, or borrowed money.

A pregnant woman's daytime rest depended on the willingness of other household members to help with tasks. Despite the generally greater workload and time constraints, positive deviance women, placing high premiums on rest, were able to generate such assistance from acquiescent sisters-in-law or mothers-in-law.

Women ate less during pregnancy because of their perception that digestive problems from larger meals “makes me tired,” “disturbs my breathing,” “prevents me from sleeping soundly,” and “causes stomach pain.”

Interestingly, most mothers and mothers-in-law agreed that increased food consumption during pregnancy would be healthier for both the mother and the child. Positive deviance mothers in Al-Ghatousha consumed more meat, the most expensive local food, but considered it “necessary for health and for preventing weakness”; their husbands sacrificed some or their entire share. Positive deviance women also increased their consumption of less expensive (“high in vitamins”) vegetables.

Discussion

These positive deviance inquiries used pregnancy weight gain and birthweight as outcome indicators to yield a set of common findings for informing pregnancy outcome-related programs. The most important characteristics that distinguished low-income women who had good weight gain during pregnancy and offspring with good birthweight from other women who did not have these desired outcomes were increased number of antenatal visits, more rest, and the absence of symptoms suggesting urinary tract infection. Moreover, these associations were observed in two communities with markedly different economic conditions. Increased meat and vegetable consumption appeared to be less robust, since this was found only in low-income women with good pregnancy weight gain, but not in low-income women whose offspring had good birthweight. Nevertheless, further exploration of these associations appears warranted. Other associations—which are generally less amenable to short-term programming—included economic status, parity, maternal schooling, and use of tap water and latrines. The vulnerability of high-parity women to low pregnancy weight gain and of primiparous women to

lower birthweight underlines the importance of special attention to both of these groups.

This pregnancy-related positive deviance inquiry represents a new application of positive deviance. The pilot nature of the study, together with the unusual data-collection methods required by local authorities, demands a cautious interpretation. The results, however, are consistent with those of a large study of risk factors for low birthweight in Al-Minia Governorate in 1996–97 that followed 617 pregnant women and their offspring, examining a wide range of variables, including biochemical measurements [8]. Multivariate analysis found antenatal care and protein intake to be the most significant predictors of low birthweight, except for congenital abnormalities and rare cases of birth intervals of less than one year. Bivariate analysis identified urinary tract infection and first pregnancies as significant risk factors. The incidence of low birthweight was nearly one and a half times greater for women who did not have daytime rest.

International research on low birthweight consistently cites the maternal environment as its most important determinant, specifically factors that prevent normal circulation across the placenta, thus restricting nutrient and oxygen supply to the fetus. These factors often include maternal malnutrition, endemic malaria, anemia, diabetes, and chronic infections, including sexually transmitted diseases and urinary tract infections [5]. Regarding diet, the importance of animal protein consumption as a positive deviance behavior in Al-Ghatousha was underscored by the nonavailability of iron–folic acid antenatal supplements. The increased bean consumption among the poor gainers brings to mind the potential of fiber to bind nutrients, such as zinc [9]. On the other hand, the increased oil and dairy consumption among good gainers may have boosted their intake of essential fatty acids, protein, and total calories. Because food grains, beans, and fats represented a larger proportion of total daily calories than meat and vegetables, it was possible for these women to increase the latter two during pregnancy while decreasing overall caloric intake.

The reporting of possible urinary tract symptoms by those with worse outcomes is provocative. Although cloudy or bloody urine has a vast differential diagnosis,

including schistosomiasis, bacterial vaginosis, dehydration, nephrotic syndrome, glomerulonephritis, and consumption of urate-high foods, the likelihood that these symptoms were, at least in part, due to urinary tract infection is increased by findings from the Al-Minia birthweight study of the National Research Center [8].

This preliminary report has limitations. The limitations in methods of gathering data have already been mentioned. In addition, the information gathered from the true positive deviants (the low-income good gainers or the low-income mothers with higher-birthweight infants) was probably limited. Additionally, we are concerned by the unrealistically low rate of low birthweight (1 in 66, or 1.5%), as compared with that reported in the Al-Minia birthweight study (8.8%).

Although the positive deviance inquiries reported here were fewer than in the Minia birthweight study, they were substantially more elaborate than the small-scale (6–10 households), rapid (2–3 days) positive deviance inquiries normally carried out by Save the Children to guide projects that rehabilitate malnourished children. In this study, however, subject enrollment was of necessity a protracted process, because of the special target group and the small total population. In the future an effort should be made to organize the data collection, including the administration of brief questionnaires within existing health services in order to mobilize health providers and communities for local problem solving with local data. There is also a need to probe further into the motivational factors leading to less common healthful practices.

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