

Comparison of a positive deviant inquiry with a case-control study to identify factors associated with nutritional status among Afghan refugee children in Pakistan

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Abstract

We compared the positive deviance (PD) approach in *Save the Children's* field guide with a case-control study (CCS) to identify behaviors associated with good nutritional status in Afghan refugee children 6 to 24 months of age in the Northwest Frontier Province (NWFP), Pakistan. The positive deviance inquiry (PDI), utilizing observations and interviews with mothers, fathers, and secondary caregivers in eight households, identified 12 feeding, caring, and health-seeking behaviors that were not widely practiced. The CCS, using the same selection criteria and content as the PDI with 50 mother-child pairs not in the PDI, yielded six significant associations with good nutritional status. Both the PDI and CCS detected feeding behaviors. The PDI alone identified complex phenomena (active feeding and maternal affect). The CCS alone confirmed the beneficial use of health services. The PD approach was an affordable, participatory, and valid method to identify feeding behaviors and other factors associated with good nutrition in this context.

Key words: positive deviance, validation, child nutrition, formative research, Pakistan

Introduction

Malnutrition is an outcome of a complex set of inter-related behavioral, social, psychological, and physi-

ological factors at the community, household, and individual levels. In environments with high levels of malnutrition and poverty most nutritional studies and programs have focused on common factors that contribute to poor growth rather than on less common factors that encourage good growth. The positive deviance (PD) approach is a strategy that identifies factors that enable some children to thrive in harsh environments. In nutrition, the term positive deviance (PD) has been used to describe children who grow and develop well in hostile environments [1]. This concept emerged from the observation that well-nourished children can be found in most poor communities with impoverished families [2]. Numerous studies have been completed examining the results of PD studies [2–4], but we could find none that attempted to validate the PD methodology.

Save the Children/US (SC/US) incorporated PD as a cornerstone of its two-year poverty alleviation and nutrition program (PANP) in Vietnam from 1993 to 1995. This program was associated with a 40% reduction in moderate malnutrition and a 68% reduction in severe malnutrition [1]. Mackintosh et al. [5] returned to the study commune sites three and four years after the end of the PANP and found that younger siblings of the PANP participants were nutritionally better off than those of non-participants and that many of the good care-seeking, health-seeking, and feeding behaviors persisted.

In 1998, SC published a manual, *Designing a community-based nutrition program using the hearth model and the positive deviance approach—A field guide*, to assist in operationalizing the PD approach [1]. The key steps in the guide are identifying a village health committee and community health volunteers (CHVs); measuring the nutritional status of the children; conducting the positive deviance inquiry (PDI); and designing nutrition education and rehabilitation sessions based on the PDI.

The PD methods are increasingly used in nutrition programs (personal communication, S. Tobing, CORE, "Hearth Technical Advisory Group Meeting,"

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April, 2000), but their validity remains untested. The objective of the present study was to compare the results of the two studies—a positive deviance inquiry (PDI) as presented in the SC manual and a case-control study (CCS)—for identifying the factors associated with good nutritional status in Afghan refugee children 6 to 24 months of age.

Methods

Study site and population

Afghans remain the largest single caseload of refugees in the world for the 17th year in succession for the United Nations High Commission for Refugees [6]. The majority of refugees arrived in Pakistan in 1979–80 following the Soviet invasion of Afghanistan. In 1994, a new wave of refugees entered Pakistan to escape fighting in Kabul, and an additional wave entered following the Taliban take-over of the capital. Most refugees reside in the Northwest Frontier Province (NWFP) and the Federally Administered Tribal Areas [6]. In 1999, the population of the refugee camps in and around Haripur, NWFP was estimated at 115,000. Most refugees are ethnically Pashtun, come from provinces bordering Pakistan, have low levels of formal education, and require women to live in strict *purdah* (isolation).

The Saudi Red Crescent Society initially established refugee camps in Haripur in 1980. They instituted basic health units (BHU), which persist as the primary setting for health services in the camps. In 1999 seven BHUs served the refugee population. In 1991, Save the Children (SC/US) assumed responsibility for the health services to the camp and supplemented the curative with preventive services, i.e., expanded program for immunizations, control of diarrheal diseases, and growth monitoring. The Haripur camps are permanent settlements on the plains along the Indus River two hours northwest of Islamabad. We conducted the PDI and CCS in the camps between May and July 1999.

Sample for the positive deviance inquiry (PDI)

The positive deviant inquiry (PDI) studied eight families from various basic health unit catchment areas. Staff helped to identify the families from existing basic health unit “at risk registers” which identified and tracked children who were malnourished using locally adapted PDI-inclusion criteria—between the ages of 6 and 24 months, Pashtun ethnicity, families with at least three children, families with one primary wage-earner employed as day labor or earning the equivalent to 50–100 Rs/day (US\$1–2)—and PDI-exclusion criteria (severely malnourished child in the same family, food scavenging personality, multiple births, mental or physical impairments, or chronic illness). The selection criteria sought typical families (i.e., no twins or

handicapped child) whose child’s nutritional success was likely due to their care, and not due to non-transferable factors (i.e., a scavenging personality or being an only child). The principal investigator confirmed the eligibility of each child and obtained verbal informed consent from those interviewed and the head of the household.

We used locally developed, Afghan refugee-specific World Food Programme guidelines to determine the socioeconomic level of families in the camps. Only households classified as “very poor” or “poor” were included in the studies. “Very poor” households lacked an able-bodied man and were typically headed by a female. “Poor households” had one able-bodied man who was typically engaged in day labor earning the equivalent of one US dollar per day. Neither very poor nor poor households had landholdings in Afghanistan [7].

We classified children as either positive deviant (PD) or non-positive deviant (NPD). A “PD child” was a well-nourished child from a poor or very poor household while a “NPD child” was a malnourished child from a poor family in the same neighborhood. Additionally, each child was considered part of either a “PD family,” a poor or very poor family with a well-nourished child, or a “NPD family,” a poor or very poor family with a malnourished child who lived in the same neighborhood [1]. This study departed from the guide in that it did not include negative deviant (ND) children, malnourished children of non-poor households, as there was little economic heterogeneity in the Afghan refugee community. Thus, the current PDI studied four PD children and their families and four NPD children and their families.

Sample for the case-control study

The case-control study included 50 children, 25 malnourished controls (12 male, 13 female) and 25 well-nourished cases (13 male, 12 female). The principal investigator (K. Lapping) applied the same selection criteria used in the PDI to identify potential study participants. Each field worker was assigned to a different basic health unit catchment area. They went house to house and screened potential participants based on the study criteria until they identified 25 well-nourished and 25 malnourished children.

Data collection: PDI

The PDI team included basic health unit male and female medical doctors, translators, and the principal investigator. The team conducted the PDI using two qualitative methods: observation of practices, food availability, household environment, and living quarters and interviews using closed- and open-ended

questions with mothers, mothers-in-law, and fathers. We recorded observations on structured worksheets. Female team members interviewed the mothers and mothers-in-law. Male team members interviewed the father at night after he returned from work. All interviews were conducted and transcribed in Pashto, translated into English by the head medical officer, and recorded by the principal investigator at the end of each day. The interview included five sections: background information on the child and family, child feeding practices, child caring practices, health-seeking behaviors, and questions to other family members (i.e., time spent with the child; opinion of child's health). The PDI team pre-tested and revised the questionnaire and the checklist during practice home-visits.

Data collection: case-control study

The case-control study (CCS) questionnaire replicated the content of the PDI questionnaire. The CCS team comprised four lady health visitors and the principal investigator. They gathered data on seven areas: demographic and socioeconomic indicators (i.e., number of children in family, years in the refugee camp, water source); child feeding practices (i.e., setting, eating order, number of meals per day, snacks, feeding during and after illness, breastfeeding frequency); child caring practices (i.e., frequency of bathing and hand washing, assistance with care-giving); health-seeking behavior (i.e., vaccination history, attendance at growth monitoring, treatment of illness); reproductive health (i.e., use of modern contraceptives, use of skilled birth attendants, desire for more children); sources of health and nutrition information (i.e., who is consulted for questions, attendance at basic health unit education classes and/or non-formal education classes) and anthropometric measurements (i.e., mid-upper arm circumference).

The case-control questionnaire was in English and all textual data were recorded in a combination of Urdu and English. If a fieldworker did not know an expression in English, she used Urdu, and later it was translated into English. The CCS team, working in pairs, pre-tested and revised the questionnaire.

The basic health unit staff trained lady health visitors to measure weight and mid-upper arm circumference (MUAC) for children in both studies. They obtained weights using a Salter spring balance model 235 PBW (Salter Brecknell Weighing Products, Minneapolis, Minn., USA) measuring a maximum of 25 kg precise to 100 g, calibrated daily. They measured MUAC with a UNICEF cloth armband precise to 0.1 cm. All measurements were taken twice, once by the principal investigator and once by a field worker. Measurements

were compared to the WHO/CDC/NCHS* reference population using weight-for-age indices. Each child was assigned a weight-for-age Z score (WAZ) using a hard copy of the reference population table. Children who were greater than 2 standard deviations below the reference population median were classified as malnourished.

Data analysis

The PDI team organized PDI data from each family, as suggested by the guide [1], into four categories: identifying information, feeding behaviors, health-seeking behaviors, and caring behaviors. The PDI team reconvened, reviewed the eight individual cases, and developed a summary table according to the guide to develop a PD profile for their community. The team identified PD behaviors according to the guide's criteria: "accessibility", or economic feasibility; "uniqueness" or different from the norm and not part of the conventional wisdom (more children would likely benefit from a new practice than from an already common practice); and "replicability" or ease of uptake by neighbors. Certain characteristics did not meet the selection criteria because they were hard to replicate or not immediately accessible to all caregivers. The guide classifies behaviors that were not accessible to the community (i.e., a wealthy uncle providing financial support) as "true but useless" that is, the factors were true for the family in question but useless for its neighbors since the behaviors were not transferable.

Quantitative data from the questionnaire were entered into and first analyzed in Epi Info, version 6.04 (CDC, Atlanta Ga., USA). A p value less than or equal to 0.05 was considered statistically significant. The primary dependant variable of interest was nutritional status as determined by WAZ. We used chi-square tests to assess statistically significant bivariate associations with nutritional status and a Fischer's exact two-tailed test to assess associations when a cell contained fewer than five values. We then imported the data into SAS (Cary, N.C., USA) and performed logistic regression to control for confounding.

After the two studies were independently analyzed, we made a matrix to compare the results of the two methods. The matrix illustrated the variables that each study identified as associated with better growth, not associated with better growth, or not asked.

Results

Positive deviance inquiry profile

Child gender was balanced (two PD girls, two PD boys, two NPD girls, and two NPD boys). The PD children

* www.cdc.gov/growthcharts

were younger than their NPD counterparts (7.5, 9.5, 10, and 11 months old versus 18, 18, 23, and 24 months old, respectively). Well-nourished older and malnourished younger children were uncommon.

The PD profile in this Afghan refugee community was strongly associated with feeding practices (table 1), including both breastfeeding and “special foods.” Although PD children were younger than 24 months, their mothers expressed the intention to continue to breastfeed for two years. The special foods (*suji halvah* and *shira*, made with sugar, flour, oil, and water with differing consistencies; and *arkhanak*, wild vegetables) were not unique, but they were nutritious and not typically fed to non-PD children. The PDI also identified good caring practices (i.e., active feeding including supervision and assistance eating or playing games and singing if the child refused to eat), and good health-seeking practices (i.e., increasing breastfeeding during diarrhea).

The PDI team isolated a number of additional behaviors, but classified them as “true but useless” (i.e., not readily transferable). These behaviors include the family supporting the mother and assisting with caregiving, the father taking an active role in family life, the mother not exhibiting a depressed temperament, the family with a strong relationship with the basic health unit staff, and the caregiver valuing preventive health measures.

Case-control study

The well-nourished and malnourished sample populations were similar for all background characteristics except age (table 2). As in the PDI, well-nourished children were younger than malnourished children (12.6 ± 3.5 vs. 15.1 ± 4.8 months, respectively, $p < .001$). We controlled for age in the multivariate analysis (table 3).

Bivariate analysis

Bivariate analysis identified six statistically significant associations with nutritional status (table 3). Younger

age was significantly associated with good nutritional status, as were up-to-date immunizations and a mother’s desire for more children. Feeding practices associated with good nutritional status included current breastfeeding, increasing breastfeeding during diarrhea, and increasing feeding during and after illness.

Adjusting for age

To control for the role that age played in nutritional status, we calculated age-adjusted comparisons (table 3). Four associations remained strong—up-to-date immunizations, increasing breastfeeding during diarrhea, increasing feeding during and after illness, and desiring more children.

Comparison of methods

We made a matrix to compare the results of the PDI and CCS (table 4). The CCS identified four of the 12 behaviors identified by the PDI (table 1): breastfeeding for two years, exclusive breastfeeding, increasing breastfeeding during diarrhea, and increasing feeding during and after illness. The CCS failed to find an association for five behaviors identified by the PDI: active feeding, three meals a day with small snacks, seeking appropriate medical care, paternal involvement (presence at family meals and time spent with the children), and family valuing preventive health services. The CCS did not explore three of the behaviors from the PDI since they were not part of the question guide: covered and freshly cooked food, supportive family, and non-depressed mother. All three were characterized as “true but useless” in the PDI. A mother’s desire for more children and child age were significant in the CCS but were not investigated in the PDI. Lastly, the PDI asked about, but did not include in the PD profile, two significant associations found in the CCS: immunization status and use of growth monitoring services.

Discussion

This study evaluated the PD approach by comparing a PD profile to a case-control study using both methods

TABLE 1. PD profile of poor families with well-nourished children

Good feeding practices	Good caring practices	Good health-seeking practices
Intention to breastfeed for two years Exclusive breastfeeding for first four to six months Feeding 3 or more times a day Snacks throughout the day Special foods given including: <i>shira</i> , <i>halvah suji</i> (sugar, flour, oil and water mixtures of different consistencies), <i>arkhanak</i> (wild vegetables)	Active feeding, including supervision and assistance eating as well as games and songs if child doesn’t want to eat The importance of child not eating last and receiving good foods is understood Food is freshly cooked and covered to keep flies away Mother has help with care-giving and some family support	Mother increases breastfeeding during episodes of diarrhea Child is fed more during illness and recovery period Appropriate medical responses are sought based on child’s symptoms (religious leader may be consulted but in conjunction with other methods)

TABLE 2. Descriptive statistics of Afghan refugee case-control study population, Haripur NWFP, Pakistan

Variable	WAZ > -2 (n = 25)	WAZ < -2 (n = 25)	p value
Mother's age (yr) ^a	28.8 (5.38)	30.7 (5.39)	.86
Child's age (mo)	12.6 (3.49)	15.1 (4.79)	.06
Child's age (mo)			
6–12	21 (84)	4 (16)	<.001*
12–24	10 (40)	15 (60)	
Child's gender			
Male	13 (52)	12 (48)	.77
Female	12 (48)	13 (52)	
No. of children	5.5 (2.3)	5.8 (1.9)	.77
Mother's level of formal education ^b			
None	25 (100)	22 (88)	.20
Primary	0	2 (4)	
Secondary	0	1 (8)	
Number of years in camp			
> 5	2 (8)	5 (20)	.06
5–10	6 (24)	1 (4)	
11–15	3 (12)	1 (4)	
16–20	14 (56)	13 (52)	
> 20	0	1 (4)	
Unknown	0	1 (4)	
Mothers who can go to basic health unit without permission	9 (36)	7 (28)	.54
How often visited by a female health supervisor			
Never	0	1 (4)	.39
Seldom	5 (20)	2 (8)	
Often	18 (72)	18 (72)	
All the time	2 (8)	4 (16)	
Type of gate			
None	7 (28)	4 (16)	.566
Wood	16 (64)	18 (72)	
Metal	2 (4)	3 (12)	
Household possessions			
Radio	4 (16)	7 (28)	.30
Fan	21 (84)	22 (88)	.68
Watch	14 (56)	14 (56)	.97
Bicycle	20 (8)	5 (20)	.22
Sewing machine	1 (4)	2 (8)	.55
Have a garden	2 (8)	0	.48
Have animals	14 (56)	15 (60)	.77
Growth monitoring last month	16 (64)	9 (36)	.51
Correctly vaccinated for age	24 (94)	18 (72)	.048*
Want more children	14 (56)	7 (28)	.047*
Gave colostrum	23 (92)	20 (80)	.41
Currently breastfeeding	25 (100)	19 (76)	.022*
Had diarrhea in past two weeks	8 (32)	13 (52)	.16
Increase breastfeeding during diarrhea	23 (92)	10 (40)	<.001*
Increase feeding during/after illness	22 (88)	5 (20)	<.001*

a. Mean (SD), ANOVA test for significance.

b. Number (%), Chi square test for significance.

* $p < .05$ (significant).

to identify behaviors associated with better or worse nutritional status among Afghan refugee children 6 to 24 months old. This is the first study to compare the smaller-sample, qualitative PD approach with a conventional larger-sample, quantitative research design to identify associations between independent and dependent variables. It is instructive to examine the kinds of information provided by one, the other, or both methods.

Behaviors identified by both studies

Two of the behaviors that both studies captured as associated with good nutritional status were related to the nutritional management of childhood illnesses: increasing breastmilk when the child had diarrhea and increasing feeding during the illness and recovery period. In Pakistan, diarrhea has been the number

one cause of mortality for children under five years of age [7]. Within this context, the PDI and CCS both identified critical life-saving behaviors. Moreover, the other two behaviors that both identified, sustained breastfeeding and exclusive breastfeeding, will prevent diarrhea and other morbidity. The intention for sustained breastfeeding, as discovered by the PDI, probably has a tenuous association with good current nutritional status.

Behaviors identified by the PDI, but not by the CCS

The CCS questionnaire replicated the content of the PDI question guide. However, some PD behaviors were missed either because they were not significant in or not investigated by the CCS. In the “not significant” group, some concepts were difficult to measure by interview. For example, “snack” was difficult for the study population to understand in the interview format. On the other hand, with the PDI, the team was able to observe whether or not a child was fed snacks. Furthermore, complex behaviors, such as active feeding typically defy measurement by closed-ended questioning, and direct observation is mandatory.

The not investigated by the CCS group included conditions not anticipated by the PDI observation/interview guide. A strength of the semi-structured PDI approach is the encouragement to record serendipitous, new observations. Obviously food preparation and storage were items that might have been anticipated and sought in a semi-structured way. On the other hand, a supportive family that assisted with childcare and maternal affect were new concepts. The team ultimately categorized them as “true but useless;” however, community dialogue had begun, and perhaps long-term programming goals to mobilize community support for mothers and children were influenced.

We are reassured that the conditions identified only by the PDI were likely to be beneficial, have low- or

TABLE 3. Unadjusted age and adjusted age models predicting good growth

Variable	Unadjusted		Age adjusted	
	OR	p value	OR	p value
Child’s age (mo)	6.75	.001*		
Correctly vaccinated for age	9.33	.02*	10.57	.046*
Currently breast-feeding ^a		.02*		.96
Increase feeding during and after illness	29.33	<.001*	21.45	<.001*
Increase breastfeeding during diarrhea	17.25	<.001*	19.25	.003*
Want more children	3.27	.04*	6.53	.03*

a. A cell contained no values and an odds ratio could not be calculated

* Statistically significant.

TABLE 4. Behaviors associated with better growth as captured by PDI and case control methods

Positive deviance inquiry	Case-control study		
	Significantly associated	Not significantly associated	Not asked or not considered
Significantly associated	Intention to breastfeed for 2 years Exclusive breastfeeding Increases breastfeeding during diarrhea Fed more during and after illness	Active feeding 3 + meals/day and snacks Appropriate medical care sought Paternal involvement Preventive services are worthwhile	Food freshly cooked and covered Family supportive Mother’s temperament
Not significantly associated	Went to growth monitoring last month Correctly vaccinated for age		
Not asked or not considered	Wants more children Age of child		

no-risk if adopted, and have little opportunity cost. However, we could not tell if the behaviors identified by the PDI alone were invalid because of method flaw, such as small sample size, or valid but uncorroborated by the CCS because the latter lacked the power or the measurement method to identify them.

Identified by the CCS, but not by the PDI

The CCS identified important factors not captured by the PDI, i.e., use of growth monitoring and immunization services, child age, and desire for more children. One must consider both the methodological explanation and the implications. A very small sample PDI has even less statistical power to identify valid associations than a small CCS. Fortunately, providers and families in Haripur already recognized the risk of non-use of preventive health services. On the other hand, the PDI’s failure to identify use of immunizations and growth monitoring may have been a missed opportunity for community reflection, problem-solving, and response. The CCS’s association of “wanting more children” did not contribute useful information. A fuller understanding of this complex desire would be needed before a programmatic response could be fashioned. At first glance, the programmatic response (less family planning) seems counter-intuitive. Child age was not included in the PD profile, but during the course of subject selection, the team remarked on the scarcity of well-nourished older children and the relative abundance of well-nourished younger children. The implication that nutrition interventions need to occur early in a child’s life, however, was lost in the PDI process. We feel that the selection criteria in the manual may need to be modified to result in groups more balanced on age.

An explanation for some of the insensitivity of this PDI may be that we omitted the final step. That is, the guide suggests that after the team reviews the individual tables, selects the key practices, and develops the composite table, then the team should present the conclusions to the community. If community consensus confirms the findings in the composite table, then the PDI is likely valid. If not, the guide recommends that dialogue occur until reaching consensus and that the table should be adjusted to reflect this. In our situation, the community was not consulted regarding the selection of PD characteristics. Perhaps with more community interaction, the PDI would have identified more factors.

There were additional limitations to this study. Medical professionals helped to conduct the PDI, and their biomedical orientation may have influenced what they observed and recorded in PD and NPD households and what they classified as PD and NPD behaviors. Another limitation is that different field workers were used for the two studies. Generalizability of specific findings

may have been limited since we gathered data during the summer. Finally, the ages of the PD and NPD children differed because of the difficulty of locating closely matched subjects without rosters of children, ages, and weights. Except for sustained breastfeeding, however, this age difference would have unlikely biased the other PDI findings.

The use of the PD approach in Pakistan differed from most SC programs, which typically follow the PDI with a series of home-based rehabilitation sessions for malnourished children and their caregivers [1]. Our experience demonstrated that the PDI can be done as a “stand-alone” rapid assessment tool and can be accomplished with minimal baseline malnutrition data. In a departure from some other PD studies [4], this study looked at NPD rather than ND children. On one hand, comparing a poor family’s nutritional success (PD) to a better off family’s lack of success (ND) may be “doubly motivating” by demonstrating that impoverished families can raise well-nourished children *and* that wealth is neither necessary nor sufficient for such outcomes. On the other hand, comparing PD and NPD families’ behaviors is less confounded by socioeconomic status and, thus, more valid.

In conclusion, the PDI identified key feeding behaviors associated with good child growth and may have been better than the CCS in capturing attitudes (i.e., mother’s affect) and complex behaviors (active feeding) that the CCS may have lacked the power or design to detect. Each method has its strengths and weaknesses (table 5). Goals, resources, and staff ability should

TABLE 5. Comparison of pros and cons of the positive deviance inquiry and the case-control study

Pro	Con
Positive deviance inquiry	
Captures practical, important behaviors Mobilizes, challenges community Includes observations Less expensive Results available same day Controls for confounders by selection criteria May detect key behaviors that CCS lacks power to detect	Cannot measure strength of association (although community vetting is a qualitative way to assess importance) Tiny sample may miss important, even less common, behaviors
Case-control study	
Measures strength of association Can control for confounding by selection criteria and in analysis	Expensive Community more detached from study Results not immediately available Lacks power to detect all important associations

determine the use of PDI versus CCS. If resources allow, use of both approaches may be optimal. Even alone, the PDI approach as outlined in the guide provides prompt, useful information regarding replicable and sustainable health-seeking, caring, and feeding practices that enable good growth.

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Acknowledgements

This research was supported by the Trans-Cultural Fund at Emory University's Rollins School of Public Health. We acknowledge the enthusiasm and patience of several Save the Children staff at the Pakistan Afghanistan Field Office in Islamabad, and the eager engagement of many Afghan refugee families.