Quality and Utilization of Services of Intervention Program of Child Health: An Econometric Analysis

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Abstract

Despite its more than three decades of existence, the limited success of the ICDS Scheme—India's primary response to early childhood care and development, in achieving its key objectives of addressing child malnutrition, morbidity and mortality is still being debated among the policy makers, social researchers, academics and program managers. Evidence show that low levels of participation and utilization of ICDS services by the community, are some of key factors to achieve the program goals. In this context, the quality of ICDS service delivery has been much talked about. Yet, there have not been many attempts at defining or measuring this aspect or studying the effects of quality on registration and utilization of ICDS services. It could be argued that improving the quality and accessibility to health and nutrition services is a potential mean to improve utilization and thereby improve health and nutrition status of children. Using a large household survey and AWC service-availability data, this paper attempts to define quality of ICDS services and analyzes the impact of quality on utilization of these services. We also study other factors, besides quality, that affect utilization.

Keywords: Impact Assessment, Quality, Child Health, Nutrition, Evaluation, ICDS, India

1. Introduction

The Integrated Child Development Services (ICDS) Scheme is one of the main flagship programs of Government of India (GoI) that is primarily designed to address nutritional and developmental needs of the children below six years, pregnant women and nursing mothers. Implemented through a network of over one million village-level Anganwadi Centres (AWCs), staffed by Anganwadi Workers (AWWs) and Anganwadi Helpers (AWHs), the program reaches around 82 million children and about 19 million pregnant and nursing mothers as on December 2015. The program is recognized as one of the world's largest and unique early childhood development program. The NFHS-4 (2015–16) results on malnutrition and other related indicators are pointers to the fact that the program's success, despite being in existence over three and half decades, in addressing one of its core objectives of reduction in child under nutrition, is rather limited. About 20 percent children below five years are still underweight and out of these, about 16 percent are severely malnourished, thus depriving a whole lot of children mostly from underprivileged sections a health and nourished start in their life. Among many challenges that the ICDS program faces, it is often debated that its reach to the needy populations and utilization of its six services are by these populations, are sub-optimal. Despite the importance given to provision of services and care, unfortunately, even at the highest policy making levels, there does not appear to be adequate recognition that a conscious effort is needed to operationally define quality of care in the context of child health programs, its indicators and standards (Kanani 1998). Though there is no clear definition of quality in ICDS, the Working Group on Child Development for the 11th Plan had suggested that monthly weighing of all under-three children at the AWC and counseling their mothers be taken as a key coverage as well as service quality indicator in ICDS (MWCD 2007). However, it may be insufficient to link quality with just a single activity of weighing in ICDS. It is generally believed that the quality of services in ICDS depends on a range of factors—the quality of AWC infrastructure, regularity in service delivery especially the timely supply and distribution of food supplements, quality and acceptance of supplementary food by the community.

Skills of the AWWs and their attitude and commitments towards their work, community participation, effective and functional convergence between ICDS and NRHM workers etc. Despite the extremely important development issue of child health and nutrition and the aspect of quality of ICDS and the vast number of case studies, there has not been much attempt to capture this aspect into research. Using definitions from Donabedian (1983) and Bruce (1990), this paper attempts to define and analyze the quality in ICDS using a methodology that has been applied in the quality of care framework for health care systems. The paper is organized as follows. We discuss the concept of quality in section 2. The definition, measurement and assessment issues are addressed here. This section also discusses the evolution of the quality-of-care concept and the studies that have used this concept. The data and methodology are discussed in section 3. Descriptive results and analysis are presented in section 4. In section 5, we summarize the key findings of this paper.

2. Quality: Definition and Measurement

Quality of care is a multidimensional concept consisting of objective and subjective elements. The earliest use of this concept has been in the medical care. In 1980, Donabedian provided one of the earliest definitions of high-quality care as "the kind of care which is expected to maximize an inclusive measure of patient welfare, after one has taken account of the balance of expected gains and losses that attend the process of care in all its parts." The 'structure, process, and output' framework for assessment of quality of care originally recommended by Donabedian is widely followed in literature.

Structural measures of quality: These typically include the characteristics of the resources in the health care system. Structure refers to provider characteristics assumed to be pre-requisites for good-quality medical care: credentials, accreditation, and license to practice. It mainly refers to the setting in which primary care is provided. These include staff, organizations and systems of care, geographic location, and accessibility of the provider of care to deliver quality health care. Structure indicators (for example whether AWW/ ANM are suitably qualified and whether AWCs are appropriately equipped) represent indicators of the characteristics of, or inputs to, health care. Though they may represent necessary conditions for the delivery of a given quality of health care but they are not sufficient. Their presence does not ensure that appropriate processes are carried out or that satisfactory outcomes are achieved by the health system (Kelley and Hurst 2006).

Process measures of quality: a term used to measure and define this is performance measurement. Process refers to the actual delivery and receipt of care. Measures of performance may include interpersonal aspects of care, service, timeliness and convenience. Measures of process evaluate either the technical or the personal aspects of the quality of care. The technical aspects of care include the timeline and accuracy of diagnosis, the appropriateness of treatment and coordination of care across delivery settings. The personal aspects, which include continuity, communication, whole-person orientation, interpersonal treatment, patient trust, comprehensiveness, and coordination, usually are assessed through surveys of patients' perceptions.

Outcome measures: Outcome measures include reporting and perception of mothers/respondents about the health of their child (e.g. a scale that asks a mother if the health of her child is "excellent, very good, good, fair or poor" or if she knows about the weight of her child). Outcome measurement is in some ways the ultimate form of quality measurement because what interests most people is whether utilization of ICDS has made any impact to health status of the children. The main challenge to outcome indicators is that they may be influenced by other factors but quality of care.

The issue, then, is that there has to be sufficient evidence that quality of care provided at AWC makes an independent contribution to the health outcome of children. Building on the work of Donabedian, Bruce (1990) operationalized a quality of care framework for family planning programs and emphasized the importance of quality as a determinant of service acceptance and sustained use. Defining quality in terms of the way individuals are treated by the system providing services, the study emphasized that client's knowledge and satisfaction with the care received should not be viewed simply as bridges to continued use, but also valued end products of conscientious management and caring services.

Presented below is the framework suggested by Bruce that can well be adapted to the ICDS program. There are six salient elements of a program that together constitute quality: (a) choice of methods – these refer to the number of services offered on a reliable basis (b) information given to clients – these refer to the information imparted during service contact that enables mothers/parents to choose and use various ICDS services (c) technical competence – involves factors such as the competence of the clinical techniques of providers.

The observance of protocols. These would involve the expertise of AWW and ANM to provide services of immunizations, ante-natal care etc. (d) interpersonal relations – these are personal dimensions of service delivery (e) mechanisms to encourage continuity –involve well informed users managing continuity on their own or formal mechanisms within the program.

AWW should ensure that targeted children, pregnant women and lactating mothers continue to use the ICDS services once they are registered at the AWC and finally (f) appropriate constellation of services—refers to various components of ICDS that are provided through AWC. These services should be provided in a manner so that they are convenient and acceptable to clients and meet their needs. To our knowledge, the aforesaid concept of quality measurement has yet to be used in the realm of ICDS. We propose to extend this methodology to access quality of ICDS.

3 Methodology and data

3.1 Econometric specification of the Model

Demand for ICDS services can be considered primarily a function of the desire of the mother (or a household) to improve health and nutrition status of her child. Typically the health maximizing behavior is derived from some form of household demand framework, where a mother (or couple) maximizes a utility function that is subject to a set of constraints (Becker 1965). Utility is derived from children both in terms of quality and quantity, in several ways. There is a consumption aspect to children and as well an investment aspect. Using the Becker model, we estimate the reduced form determinants of health that relate to health status and the probability of use of ICDS services. To derive the determinants of the facility use, we make the standard assumption that households make decisions by maximizing their overall welfare. We use the logistic regression method for all estimations. The logit model estimates the conditional mean value of a dichotomous outcome (Kennedy, 1996).

The logit (L) is the log of the odds ratio and can be expressed as $L= \ln [Pr (Y=1) / Pr (Y=0)] = x\beta$, where β is a vector of parameters for x explanatory variables. The left hand side of the equation represents the log odds of the outcome associated with the explanatory variables in question. The logit model is used in this paper to estimate the probability of registration and attendance using the following econometric specification: $\text{logit}(Y_{ij}) = \alpha X_{ij} + \beta Z_{ij} + \gamma Q_J + \varepsilon_i$ where $Y_{ij} =1$ if child is registered/attending the nth AWC. X_{ij} is a vector of explanatory variables containing child characteristics, Z_{ij} is a vector of explanatory variables containing paternal characteristics and Q_j is the quality of the AWC which the child attends. Our main interest is to study the impact of quality on utilization, the estimate γ. Four variants of the model are estimated. In the base model, only child characteristics viz., sex and age are included with the hypothesis that there would be differences in outcome for a male child as there exists gender bias and this could probably affect the utilization of services as well. The second variant includes paternal education variables, which are recognized as important determinants that influence in making decisions on utilization of public services. Our hypothesis is that with higher levels of education of parents, the probability of registration as well as attendance would increase. In the next variant we include the household characteristics. Finally, we estimate the full model that includes quality indices. We expect quality to be an important determinant in explaining registration and attendance. 3.2 Data We use the data from a household survey in the state of Rajasthan that was undertaken as part of an end line survey of the World Bank assisted ICDS-III/WCD project during 2005–06 (IIHMR 2006). The survey employed a multistage sampling technique, which consisted of three stages; in the first, second and third stages, blocks, AWCs and households were selected for sampling respectively. A total of 17,427 households, 15,357 children in the age group 0–72 months and 288 AWWs were covered in the survey. Along the same lines as the NFHS, questionnaire administered to the head of the household collected basic socio-economic data of the household. The child questionnaire, administered to the child's mother, elicits information on the child's health status, such as recent incidence of disease; consumption of preventive and curative health services; and aspects of the mother's behavior that are related to children's health.

A part of this questionnaire also gathers information regarding mother's awareness and utilization of the AWC services. A unique aspect of this dataset that is crucial to our study is the questionnaire administered to the AWWs. The AWW's schedule includes detailed information on infrastructure facilities available at the AWC, manpower, inter-sectoral co-ordination etc. Information regarding education, knowledge and skills of the AWW of tasks related to early childhood care was also collected. This data is of great relevance for the present study.

The questionnaire administered to AWWs is very similar to the service availability module (Mensch et al 1996) which gives us a unique opportunity to get data on the facilities available at the AWC, and also regarding training and supervision, availability and use IEC materials etc. We generate a quality index, depicting physical and human resource quality, for the AWC using information in the AWW schedule and then merge it with the service utilization data in the child questionnaire. The unit of analysis is an individual child. In this manner we are able to map the characteristics/ quality of the AWC on each child that has access to the same AWC. Variables used in Estimation Dependent Variables: We use two dependent variables which are dichotomous, to understand utilization of ICDS services. We create dummy variables and estimate the probability of a child being registered at the AWC and the probability of the child visiting the AWC. Of all the 15355 children, only 6423 children were found to be registered with the AWCs. Also, among these, only 4058 were using any of the AWC services. Independent Variables: Determinants of utilization of ICDS services include several independent variables, both socioeconomic and demographic. These are: (i) gender of the child (dichotomous variable); (ii) age of the child (divided into 12 months categories for the study); (iii) education status of father and mother; (iv) location of AWC – rural, urban or tribal (included as dummy variable); (v) religion (dummy variable); (vi) caste (general/SC/ST/OBC); (vii) occupation of the household; (viii) income of the household (income is a tricky variable because of general resistance to disclose it. We recode the income to convert it into slabs of 4000, 10000, 20000, 40000, > 40000 (per year); and (ix) Standard of Living Index (SLI)—created as a proxy for assessing the economic status of the household4, having three levels – low, medium and high. An important objective of this study is to provide a measurement of quality and assess the role it plays in the decision to seek health care. Presented below are the variables that we would use to create an index of quality at AWC. We use arguments provided in family planning literature for inclusion in the indices. Physical Infrastructure Index: This includes various types of facilities and services available at the AWC.

Each AWC should have the minimum infrastructure and equipment required for effective delivery of services. The AWW's schedule provides information on various infrastructural facilities including availability of weighing scales, storage arrangements, drinking water, cooking utensils, medicine kits, child-friendly toilets, a kitchen shed, toys, etc. Using factor analysis, we construct infrastructure index based on the following variables are used: (i) availability of weighing scale ("is weighing scale available at the AWC?" A dummy variable is created to indicate availability of weighing scale) (ii) drinking water facility ("Do you have drinking water facility?" A dummy variable indicates presence of clean drinking water. We take tap and well water as presence of clean water whereas no facility or others as no facility), (iii) toilet facility ("Do you have a toilet facility?") (iv) availability of indoor-outdoor play materials (v) availability of medicine kit: Every AWC should have a medicine kit with basic drugs (including ORS and IFA tablets), to be distributed by the AWW with appropriate training as well as guidance; (vi) availability of pre-school education kits; (vii) supply of supplementary nutrition food ("Are there adequate food stocks at the AWC?", "Do you have the take home ration program in this centre?"). Dummies were created to indicate presence. (viii) Growth monitoring—This is an important activity as part of supplementary nutrition service, not only to keep check on growth but also for reallocation of resources and food rations for undernourished children identified through growth monitoring. Maintenance of records is necessary for this planning and also from point of view of evaluations and follow-up. Mere presence of growth charts is not of much use if these are not filled up regularly. The question "Where do you record the children's weight" points out if registers are filled in regularly as per requirement. A separate question on "the number of growth charts filled up last month" was asked. The interviewer was instructed to physically check the number of growth charts filled in to ensure validity of responses by the AWW.

Human Resource Index: Besides the hardware available at the AWCs, the human aspect is equally important. Since the services provided at the AWC are not truly in the nature of curative care, the capacity and capability of the AWWs play an important role in attracting the targeted beneficiary towards availing AWC services. We use the following variables to construct the human resource index: (i) Profile of AWWs— educational status, marital and caste status; (ii) Supervision and Management: Supervision within a program generally focuses on administration and record keeping. In development driven programs it also involves monitoring and ensuring the achievement of program goals. According to the ICDS guidelines, each AWC is supposed to be inspected once a month by a local Supervisor. "Did your supervisor visit you last month" provides answer for the regularity of visit by the Supervisor. Besides the Supervisor, ICDS requires regular visits by ANM. ANM and the AWW are supposed to be working in close coordination in providing health services through ICDS.

Ideally, the dates of visit of ANM are to be specified beforehand. "When did the ANM last visit the AWC?" provides an indication of frequency of visit. We create a dummy variable for this. We take all visits less than or equal one month as a visit by ANM. For visits more than three months ago, we take them as a 'no visit', as it totally fails to satisfy the goal of a visit. A similar dummy variable (=1) indicating timely visit by ANM is created. (iii) Training: The human factor can make a big difference to the effectiveness of any program that has awareness building and counselling as important ingredients. There are a whole range of issues related to the selection, training and duties of AWW. The trainings given to AWWs are important in improving the interaction between the AWW and the beneficiary. "Did you receive any training in last two years?" "Do you attend any FREQI (Free Expressions for quality improvement)3 meetings at the sectoral level during the last year?" These questions point to the frequency of trainings attended by the AWWs. We create dummies for these variables and then use them to create an index using factor analysis. The empirical strategy is as follows. First, we use the child's characteristics of gender and age. On the second model, we include paternal education. The household characteristics are included in estimation. Finally, the full model including the quality indices is estimated.

4. Analysis and Results

The analysis is divided into two sub-sections. In the first section, we discuss results of logistic regression models assessing the effects of quality-of-care and demand variables on the likelihood of registering with the ICDS. In the next section, we present results of regressions assessing impact on likelihood of actual use of these services. We estimate four models. In the first only child characteristics are included. Model 2 adds on parental education. Model 3 includes household characteristics as well. And finally we also include quality of AWC. 4.1 Explaining Registration in AWC We analyze the data to look at factors that influence the decision to register (the child) or not register with AWC. Our hypothesis is that the following reasons may influence the decision: child level factors like sex and age of child and parental education; Socio Economic: Caste, Religion, Location; Quality of ICDS program and delivery of service. The dependent variable is a dichotomous variable with value of '1' or '0' depending whether the respondent is registered at AWC or not. Out of a total of 15,355 respondents, only 6423 have registered for AWC. Only 41 % of the children in the targeted age groups are registered at the AWCs. In this section, we try to explore the reason for these low levels of registration. Data shows that around 43% of boys and 41% of girls were registered at AWC. Only 22% of children in the first year of age are registered and this figure increases up to 4 years of age and declines for children above that. Of the total number of children registered, 66% belong to the age group 0–3 years. Children of 51% of literate fathers are registered and this figure falls to 35% for graduate fathers. A similar trend is seen for mother's education status. 44% of children of literate mothers are registered while only 24% of graduate mothers have their children registered.

A lower percentage of children belonging to more educated parents are registered with ICDS. Children belonging to general caste have lower registration rates (34%) as compared to scheduled caste (46%), scheduled tribes (44%) and other backward castes (44%). Muslim children have the lowest registration rates (36%) while the corresponding figure for Hindu children is 43%. The rates are highest for Christians (63%). A higher proportion of children belonging to agricultural families are registered (47%) as compared to the salaried class (41%). Those with lower income have a higher percentage of children being registered at AWC. The chi-square was less than 5% for all the variables. This indicates that the variables are dividing the dependent variable into two significantly different groups, those who are registered and those who are not. To understand the relationship better, we estimate logit regressions. Estimation Results: Multivariate logit regression was conducted on the significant variables discussed above. As a first step, we find out the factors which are responsible for registration at AWCs. We used logit regression with registered or not as a dependent variable. The results from Table 1 indicate that Contrary to popular belief, the sex of the child is not affecting the registration at AWC. There is no indication of gender bias in providing health care to a girl child.

This is the case in all the models with the exception of model 3. We also find significant but negative coefficient between the age of the child and decision to register or not. In the simplest of the model, the likelihood of registering increases by 206 percent for a child in 12 – 23 months as compared to 0 – 12 months. The likelihood increases to 271 % for children in 24 – 35 months and 326% for children in 36 – 49 months. As we add more variables and bring in other interactions in the model, the trend stays the same. Parents tend to not register the new born and the infants – the time when the intervention can be of greatest importance. There is a higher probability to get older children registered.

Household characteristics indicate that as prosperity increases, there is a negative tendency to join the program. This is probably due to the fact that the comparatively prosperous households are in a better position to afford and get an alternative from outside.

The probability of registration is higher in rural/tribal AWCs than the urban centres. As compared to urban areas, the probability increases by 28% and 85% respectively for rural and tribal areas, as can be seen in model 3. This could be due to the lesser choices people have in the rural and tribal areas as against urban areas. Compared to children belonging to general caste, children in SC and OBC have higher probability of registration. The likelihood of getting registered increases by 50% (SC), 11% (ST) and 30% (OBC) as compared to general class of household.

After introducing control for quality, we see that in the full model, the likelihood increases by 47, 10 and 28 percent respectively for SC, ST and OBC. Log of Income as well as standard of living index has a negative and significant coefficient. The probability of getting registered decreases by 30% if the child belongs to a high standard of living index household. This is along the expected lines. As the log of household income increases by 1 unit, the probability goes down by 6% (and 8% in the full model). This confirms the fact that as the population becomes prosperous, there is a lesser tendency to attend the program. Education of parents point towards decision making process of the household. Mother's education is negatively significant at primary levels in the second model however as we add other variables in the model, the dependence becomes insignificant. A graduate mother is less likely to get her child registered as compared to an illiterate. The likelihood goes down by 50%, 43% and 48% as we as introduce more controls (moving from model 1 to model 4).

We find that father's educational levels turn out to be important determinants of registration at the AWC. Literate fathers are more likely to get their children registered as compared to illiterate fathers. The likelihood of getting registered increases by 46% in model 1 and 39% in the full model. This is not the case of maternal education which does not come to be a significant variable in our models. Interestingly, as the father gets more and more educated beyond literacy, registrations fall. The likelihood of getting the child registered goes down by 21% if the father completes primary education. The relationship is not significant for higher levels of education. This indicates towards two effects contributing in opposite directions. As the education level increases, the sensitivity towards health needs increases but as the education level increases, the income increases and choice set broadens and respondents start availing expensive private options. Quality: The two indexes created for defining quality – human resource and infrastructure are both found to be insignificant, that is a surprising result as we would expect that people would make a choice of registration and they would pay attention to quality at the AWC. Though the findings suggest that quality, whether defined by physical infrastructure at the AWC or the AWW's capacity do not affect the probability to register or not, we suspect the data were inadequate to arrive at substantive conclusion. More probing questions including that relating to attitude of the AWWs towards child care and education, her counselling skills etc would have provided clearer picture on making a choice of registration or attendance at AWC. To understand the results of quality, we create three categories of quality indexes. It is difficult to differentiate between quality of AWC on a continuous scale while the differences become more pronounced in categories; we can expect some effect of quality. We created 3 dummies indicating low, medium and high indexes for human resource as well as physical infrastructure. The regressions results are presented in Table 2. As indicated in the summary above, both the indexes are insignificant and do not seem to affect registration. We explore this further.

4.2 Explaining Attendance at AWC

We now distinguish between the registration and attendance at the AWCs. We create a dummy variable on the basis of the visiting frequency to AWC. Not visited AWC for last month has been taken as 0, while having visited even once in the past one month has been taken as 1. Out of the total 15357 children in our sample, 8933 have not registered with AWC. Out of the total 6511 who have registered for AWC, 2453 (37%) do not even attended it on a monthly basis. Our effective number of observations for further analysis is 6511. We use the same independent variables for our analysis as used in the previous section and if there are marked differences in factors that determine registration and use. Estimation Results: The chi-square test confirms the association between the variables. We use these to estimate models using logistic regressions as in the previous section. The output of various regressions conducted is summarized in Table 3. These are along similar lines as in the previous estimation of factors explaining registration at AWCs.

5. Conclusion

This paper attempts to foray into a very significant but relatively overlooked aspect of ICDS. Very few studies have modeled quality of ICDS using rigorous econometric techniques. Based on quality of care definitions and models by Donabedian (1983) and Bruce (1990), we make an attempt, to estimate quality of ICDS program using a multivariate analysis to understand its impact on registration of beneficiaries at AWCs and subsequent utilization of services delivered by the AWWs. Our results indicate the important role of parents' education, religion and household characteristics in utilization of ICDS. In order to capture quality, we derive a model using indices of quality to capture physical and human infrastructure at the AWCs. Using a unique data set that enables us to match facilities at AWC with those using these services, these indices are formulated. We study the role of quality besides other determinants of use. However, contrary to general hypothesis, we find insignificant coefficients of quality indices. This result can be explained by the lack of data to capture the process index of quality. Studies in the family planning quality literature point out the important role of interpersonal relations and interactions between the care giver (AWW) and the receiver (mother) in utilization and continued use of these services. A deeper investigation of the data (beyond the scope of this paper), is needed to understand these interpersonal relations. Despite the limitations in explaining the role of quality with respect to infrastructure and human resource on registration or utilization of ICDS services, this paper is an attempt to fill in the gap of quantifying the quality aspect in ICDS. Programmatic factors are expected to play an important role in the initiation and continued use of services of development programs and interventions. Using this model on a more extensive data with respect to use of the ICDS services, especially the nutrition and health counseling through inter-personal communications, can provide useful insights for better program management of ICDS. Also, the methodology and approach used in this paper provides an opportunity to the program managers, especially the monitoring and evaluation managers to look into the micro issues of quality through periodic evaluation and analysis of the factors that affect the quality and utilization of services in ICDS.

Table 1. Logistic Regression Results Predicting Registration at AWC

Dependent Variable	**Registered at AWC or Not**			
Statistical Method	**Logistic Regression**			
Model nos.	(1)	(2)	(3)	(4)
Observations	15355	15355	15341	8534
Log Likelihood Ratio	-9886	-9814	-9642	-5370
Explanatory Variables	**Odds Ratio (P-value)**	**Odds Ratio (P-value)**	**Odds Ratio (P-value)**	**Odds Ratio (P-value)**
Dummy child sex (if male=1)	1.049 (0.161)	1.048 (0.172)	1.059* (0.098)	1.030 (0.533)
Dummy child age (if Age 12–23 months=1)	3.061*** (0.000)	3.073*** (0.000)	3.141*** (0.000)	3.257*** (0.000)
Dummy child age (if Age 24–35 months=1	3.707*** (0.000)	3.747*** (0.000)	3.828*** (0.000)	4.019*** (0.000)
Dummy child age (if Age 36–47 months=1	4.263*** (0.000)	4.322*** (0.000)	4.492*** (0.000)	4.338*** (0.000)
Dummy child age (if Age 48–59 months=1)	3.415*** (0.000)	3.417*** (0.000)	3.513*** (0.000)	3.590*** (0.000)
Dummy child age (Age of Child = > 60 months=1)	3.586*** (0.000)	3.555*** (0.000)	3.659*** (0.000)	3.373*** (0.000)
Dummy mother education (if literate=1)		1.008 (0.918)	1.141* (0.083)	1.033 (0.751)
Dummy mother education (if primary=1)		0.842** (0.036)	0.912 (0.272)	1.038 (0.740)
Dummy mother education (if high school=1)		0.896 (0.158)	1.012 (0.884)	0.991 (0.935)
Dummy mother education (if graduate=1)		0.503*** (0.000)	0.574*** (0.000)	0.518*** (0.000)
Dummy father education (if literate=1)		1.459*** (0.000)	1.552*** (0.000)	1.393*** (0.001)

Dummy father education (if primary=1)		0.786*** (0.001)	0.813*** (0.004)	0.865 (0.130)
Dummy father education (if high school=1)		0.959 (0.413)	1.004 (0.934)	1.049 (0.495)
Dummy father education (if graduate=1)		0.953 (0.536)	0.957 (0.582)	0.964 (0.744)
Dummy religion (if muslim=1)			1.013 (0.827)	1.011 (0.883)
Dummy religion (if christian=1			2.462** (0.049)	3.375** (0.033)
Dummy religion (if sikh=1			1.446 (0.114)	1.298 (0.387)
Dummy Occupation(if salaried job=1)			1.064 (0.350)	1.056 (0.551)
Dummy Occupation (if casual labour=1)			0.876*** (0.003)	0.843*** (0.004)
Dummy Occupation (if trading=1)			0.954 (0.415)	0.976 (0.753)
Dummy Standard of Living Index (if medium=1)			0.991 (0.845)	1.011 (0.862)
Dummy Standard of living Index (if high=1)			0.696*** (0.000)	0.681*** (0.000)
Dummy block type (if rural=1)			1.281*** (0.000)	1.211*** (0.003)
Dummy block type (if tribal=1)			1.847*** (0.000)	1.794*** (0.000)
Log of Household Income			0.936** (0.046)	0.914** (0.044)
Dummy caste (if SC=1)			1.497*** (0.000)	1.465*** (0.000)
Dummy caste (if ST=1)			1.105 (0.124)	1.098 (0.284)
Dummy caste (if OBC=1)			1.302*** (0.000)	1.284*** (0.000)
Quality: Human Resource Index				1.026 (0.797)
Quality: Infrastructure Index				0.768 (0.178)

*P Values in parentheses; * significant at 10%; ** significant at 5%; *** significant at 1%*

Table 2. Factors Affecting Predicting Registration at the AWC with Different Categories of AWC Quality

Dependent Variable	**Registering AWC or Not**
Observations	15341
Log Likelihood Ratios	9641
Explanatory Variables	**Odds Ratio (P-value)**
Dummy child sex (if male=1)	1.059 (0.102)
Dummy child age (if Age 12–23 months=1)	3.141***(0.000)
Dummy child age (if Age 24–35 months=1)	3.827***(0.000)
Dummy child age (if Age 36–47 months=1)	4.491***(0.000)
Dummy child age (if Age 48–59 months=1)	3.516***(0.000)
Dummy child age (Age ≥ 60 months=1)	3.666***(0.000)
Dummy mother education (if literate=1)	1.141*(0.082)
Dummy mother education (if primary=1)	0.912(0.273)
Dummy mother education (if high school=1)	1.012(0.880)
Dummy mother education (if graduate=1)	0.574***(0.000)
Dummy father education (if literate=1)	1.551***(0.000)
Dummy father education (if primary=1)	0.813***(0.004)

Dummy father education (if high school=1)	1.004(0.936)
Dummy father education (if graduate=1)	0.957(0.581)
Dummy religion (if muslim=1)	1.013(0.827)
Dummy religion (if christian=1)	2.459**(0.049)
Dummy religion (if sikh=1)	1.442(0.117)
Dummy Occupation (if salaried job=1)	1.063(0.359)
Dummy Occupation (if casual labour=1)	0.876***(0.003)
Dummy Occupation (if trading=1)	0.952(0.398)
Dummy standard of living index (if medium=1)	0.992(0.871)
Dummy standard of living index (if high=1)	0.698***(0.000)
Dummy block type (if rural=1)	1.280***(0.000)
Dummy block type (if tribal=1)	1.850***(0.000)
Log of household income	0.937**(0.048)
Dummy caste (if SC=1)	1.497***(0.000)
Dummy caste (if ST=1)	1.107(0.119)
Dummy caste (if OBC=1)	1.301***(0.000)
Dummy Quality: Human Resource Index (if medium=1)	1.023(0.884)
Dummy Quality: Human Resource Index (if high=1)	0.900(0.428)
Dummy Quality: Infrastructure Index (if medium=1	1.005(0.910)
Dummy Quality: Infrastructure index (if high=1)	1.001(0.977)

P Values in parentheses; * significant at 10%; ** significant at 5%; *** significant at 1%

Table 3. Factors Affecting Predicting Attendance at the AWC with different Categories of AWC Quality

Dependent Variable	Visiting AWC or Not			
Statistical Method	Logistic Regression			
Equation No.	(1)	(2)	(3)	(4)
Observations	6423	6423	6416	3588
Log Likelihood Ratios	-3800	-3754	-3716	-2076
Explanatory Variables	Odds Ratio (P-value)	Odds Ratio (P-value)	Odds Ratio (P-value)	Odds Ratio (P-value)
Dummy child sex (if male=1)	0.984 (0.773)	0.987 (0.818)	0.999 (0.981)	0.915 (0.245)
Dummy child age (if age 12–23 months=1)	2.847*** (0.000)	2.859*** (0.000)	2.877*** (0.000)	2.940*** (0.000)
Dummy child age (if age 24–35 months=1	6.778*** (0.000)	6.896*** (0.000)	7.070*** (0.000)	7.130*** (0.000)
Dummy child age (if age 36–47 months=1)	10.111*** (0.000)	10.224*** (0.000)	10.268*** (0.000)	12.303*** (0.000)
Dummy child age (if age 48–59 months=1)	11.362*** (0.000)	11.394*** (0.000)	11.774*** (0.000)	11.357*** (0.000)
Dummy child age (if age ≥ 60 months=1)	9.289*** (0.000)	9.172*** (0.000)	9.244*** (0.000)	10.298*** (0.000)
Dummy mother education (if literate=1)		1.423*** (0.004)	1.539*** (0.001)	1.494** (0.020)
Dummy mother education (if primary=1)		0.690*** (0.007)	0.732** (0.025)	0.700* (0.061)
Dummy mother education (if high school=1)		0.658*** (0.001)	0.698*** (0.006)	0.662** (0.022)
Dummy mother education (if graduate=1)		0.960 (0.858)	1.056 (0.816)	0.749 (0.400)
Dummy father education (if literate=1)		1.046 (0.690)	1.100 (0.404)	1.049 (0.754)
Dummy father education (if primary=1)		0.816* (0.067)	0.831* (0.099)	0.872 (0.367)

Dummy father education (if high school=1)		0.781*** (0.002)	0.838** (0.033)	0.899 (0.344)
Dummy father education (if graduate=1)		0.964 (0.774)	0.989 (0.932)	0.855 (0.390)
Dummy religion (if muslim=1)			0.936 (0.500)	0.987 (0.920)
Dummy religion (if christian=1)			2.263 (0.244)	2.637 (0.189)
Dummy religion (if sikh=1)			0.453** (0.036)	0.298** (0.016)
Dummy occupation (if salaried job=1)			1.106 (0.349)	1.124 (0.419)
Dummy occupation (if casual labour=1)			1.098 (0.188)	1.152 (0.136)
Dummy occupation (if trading=1)			0.940 (0.511)	0.949 (0.680)
Dummy standard of living index (if medium=1)			1.088 (0.253)	1.019 (0.850)
Dummy standard of living index (if high=1)			0.848* (0.089)	0.791* (0.075)
Dummy block type (if rural=1)			1.024 (0.762)	0.994 (0.957)
Dummy block type (if tribal=1)			0.902 (0.433)	0.742* (0.096)
Log of Household Income			0.809*** (0.000)	0.832** (0.013)
Dummy caste (if SC=1)			1.172* (0.083)	1.128 (0.329)
Dummy caste (if ST=1)			1.285** (0.023)	1.162 (0.309)
Dummy caste (if OBC=1)			0.979 (0.798)	0.918 (0.440)
Quality: Human Resource Index				0.846 (0.298)
Quality: Infrastructure Index				1.478 (0.215)

*P Values in parentheses; * significant at 10%; ** significant at 5%; *** significant at 1%*

References

ACC/SCN (2001): "What Works? A Review of the Efficacy and Effectiveness of Nutrition Interventions" Allen LH and Gillespie SR. ACC/SCN: Geneva in collaboration with the Asian Development Bank, Manila.Becker, Garry (1965): "A Theory of the allocation of time," Economic Journal, 75:493– 517.

Agarwal, Madhu (2004): "Comparison of Utilization of Maternal Services by Mothers of ICDS and non-ICDS areas in Urban Slums of Lucknow", *Indian Journal of Preventive & Social Science Medicine,* Vol 35(3)

Bruce, J. (1990): "Fundamental elements of the quality of care: A simple framework" *Studies in Family Planning*, 21(2): 61–91.

Donabedian A, (1983): "Quality Assessment and Monitoring: Retrospect and Prospect", *Evaluation and Health* Professions, 6: 383 (Assessed from http://ehp.sagepub.com)

Ghosh, Shanti (2004): "Child Malnutrition", *Economic & Political Weekly*, 39(40): 4412–13.

Gragnolati Michele, Caryn Bredenkamp, Meera Shekar, Monica Das Gupta, Yi-Kyoung Lee (2006), "India's Undernourished Children: A Call for Reform and Action", The World Bank

IIHMR (2007): "End line Survey of World Bank assisted ICDS-III Project (199 9–2006)", Ministry of Women and Child Development, Govt of India

Kanani, S. (1998): "Towards Quality of Care in Child Health Programmes: A Challenge for the Partnership in Health and Social Sciences", *Social Science Medicine,* 47(9):1223–1230.

Kelley, E. and J. Hurst (2006): "Health Care Quality Indicators Project: Conceptual Framework Paper" *OECD Health Working Papers, No. 23, OECD Publishing. doi:10.1787/440134737301*

Measham, A R and M Chatterjee (1999): "Wasting Away: The Crisis of Malnutrition in India" *World Bank, Washington DC, 1999*

Mensch, Barbara, Mary Arends-Kuenning and Anrudh Jain (1996): "The Impact of the Quality of Family Planning Services on Contraceptive Use in Peru" *Studies in Family Planning,* 27(2): 59–75

MWCD (2006), "Working Group Report on Child Development for the Eleventh Five Year Plan (2007–2012)-Vol. II" [http://wcd.nic.in/]

NCAER (2001), "Concurrent Evaluation of Integrated Child Development Services", *National Council of Applied Economic Research, New Delhi*

NIPCCD (1992), "National Evaluation of Integrated Child Development Services", *National Institute of Public Cooperation and Child Development, New Delhi*

Planning Commission (2008), "*Inclusive Growth: Vision and Strategy in Eleventh Five Year Plan (2007–12) Vol I*" (New Delhi: Oxford University Press)
[http://www.planningcommission.nic.in/plans/planrel/fiveyr/default.html]

Radhakrishna, R., C. Ravi and S. Indrakant (1998), "Cost effectiveness and efficiency of the nutrition programmes in India" *Hyderabad: Centre for Economics and Social Studies*

Smith L, Ramakrishnan U, Ndiaye A (2003), "the Importance of Women's Status for Child Nutrition in Developing Countries" Research Report 131, *International Food Policy Research Institute,* Washington

Whang, I. (1981), "Management of rural change in Korea" *Seoul:* (Seoul National University Press