



Long-Term Impact of ICDS on Intellectual Development of Rural Children

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ABSTRACT

The Intellectual development of young children has always been a matter of concern, especially for the disadvantaged groups in India. The Government of India has initiated several programmes with a view to stimulate the intellectual development of these groups. ICDS Scheme, one of the largest child welfare programmes in the world also includes this aspect of development in its objectives. The focus of the present paper is on the study of long-term impact of the ICDS on intellectual development and scholastic achievement of erstwhile Beneficiaries and control school children 7 to 9 years of age in A.P. Eight abilities of BK IQ test namely Speed of Response, Memory, Perception of Form, Comprehension, Sensation, Similarities, Reasoning, and Judgment were investigated. The results indicated that the abilities such as memory, perception of form, sensation and similarities are significantly higher among the erstwhile ICDS beneficiaries compared to erstwhile Non-ICDS control children. The programme content seems to stimulate these abilities more than others. These abilities, especially memory may be significantly associated with school achievement.

Key words : ICDS, Intellectual development.

The young child's development does not occur in isolation. It is vulnerable to a host of social influences. The family and the community have a strong and permanent influence on the child right from its birth, which is especially important for later learning and achievement.

1.1 Rationale for children's education:

Recent world conferences on children's education testify to a growing appreciation of the crucial importance of the child's earliest years, and of the need to support families and communities in their role as the child's most influential educator. The learning capacity and value orientations are determined by the time the child reaches the age of formal schooling.

The Central and State Governments are conscious of the fact that for the improvement in the standard of living of the poor people, a programme related to child development and education can play a vital role in accelerating the pace of social change and development. In India, there are about 27 millions of children belonging to families living in conditions of want, rendering physical and mental development difficult (Saddaika, 1984). The awareness regarding care

of children arose out of the mounting prevalence of mortality rate, their ill-health and malnutrition, neglect and denial of opportunities for adequate education.

Improving children's health and nutrition is necessary but increasingly, in a situation where fourteen out of fifteen of the world's children survive until age one, governments and civil society have to turn their attention to the psychosocial and cognitive development of children and their education. Well conceived quality early childhood programmes can help meet the diverse needs of young children during the crucial years of life, enhance their readiness for schooling and have a positive and permanent influence on later school achievement (UNESCO, 1995).

If children arrive at primary school better prepared, they can make better use of the school. Not only will dropout and repetition decrease, but also the quality of education will improve, since, the most important 'inputs' into the school system is the child. When children are prepared for formal schooling, teachers are likely to be more effective, facilities and materials can be used better, and children can also learn more from each other.

Consequent to realising the crucial importance of rapid physical and mental growth during early childhood, the Government started a number of programmes for early childhood care and education (ECCE) which provide services like immunisation, pre-school education, and nutritional supplements. The Integrated Child Development Services (ICDS) is the largest and most widely acclaimed programme and delivers its package of services through an Anganwadi Worker (AWW), a female voluntary worker from the local community educated at least up to 10th standard.

The ICDS programme is multi-sectoral in nature and hence, has evoked considerable response since its inception from students, teachers and research workers. The scheme has been subjected to intensive evaluation, research and monitoring by National institutes, Medical colleges, Home Science colleges, Schools of Social Work and other research, academic and action organisations engaged in child welfare and development.

1.2 ICDS- A Resume:

The Integrated Child Development Services (ICDS) is one of the largest multifaceted community outreach programmes, sponsored by the Government of India in 1975. It involves an integrated approach for converging basic services for improved childcare, early stimulation and learning, health and nutrition, water and environmental sanitation by targeting young children, expectant and nursing mothers and women's groups. It offers a powerful community based outreach system that functions as the convergent interface between the disadvantaged communities and governmental programmes such as the primary health care and education. The ICDS also provides increased opportunities for promoting early development, associated with improved cognitive and social skills, enrolment and retention in the early primary stage. By releasing disadvantaged girls from the burden of sibling care, the ICDS enables them participate in primary education. Therefore, the ICDS is a major programme channel for addressing the rights of young children, as defined in the UN Convention on the Rights of the Child, to which India acceded in 1992.

Drawing upon experience culled from 20 years of planned social development, the ICDS

scheme is designed both as a preventive and developmental effort. ICDS aims to reach all the needy children in the age group 0- 6 years, expectant and nursing mothers and women in the age group 15 to 45 years

All the services of the ICDS essentially converge at the Anganwadi (AW). Early Childhood Care and Education (ECCE) may well be considered the backbone of the programme. This is the most joyful play-way-daily activity, visibly sustained for three hours a day for children 3-6 years of age. ECCE, as envisaged in the ICDS, focuses on total development of underprivileged children. It also includes promotion of early stimulation of the under-threes through interventions with mothers/caregivers. The early non-formal pre-school education component of the ICDS, conducted through the medium of play, aims at providing a learning environment for promotion of social, emotional, cognitive, physical and aesthetic development of the child.

A recent large-scale study showed that the ICDS has a significant positive impact on both motor and mental development of beneficiaries even after controlling for relevant environmental factors likely to influence the growth and development of children (Vazir and Kashinath, 1999). A follow up of these children in school to assess the long-term benefits of the programme was one of the recommendations of this study.

A study was therefore undertaken with a view to evaluate the effect of ICDS programme on enrolment, retention and achievement in school and intellectual development of children exposed to the programme. The earlier study sample (Vazir and Kashinath, 1999) in 23 villages around Tirupati, was selected for the present study. Baseline information on psychosocial development, socio-economic status and demographic features of the sample (beneficiaries and controls coded) was available (Vazir and Kashinath, 1999). The following objective was set for the study:

Objective

To assess the long-term impact of the pre-school education component of ICDS on intellectual development of school going children between 7-9 years of age who had earlier been exposed to the programme.

Table 1. Distribution (%) of Erstwhile ICDS and Non-ICDS Children Enrolled, Dropped Out of School, or Never Enrolled.

Sample	Erstwhile ICDS Beneficiaries	Erstwhile Non-ICDS Controls	Total
Enrolled in School	70.4 (259)	33.2(107)	(366)
Migrants (in School)	3.3(12)	0.9(3)	(15)
Not Enrolled	13.0(48)	40.4(130)	(178)
Dropout	12.5(46)	24.8(80)	(126)
Expired	0.8(3)	0.6(2)	(5)
Total	53.3(368)	46.7(322)	690

Figures in parenthesis indicate number of children.

MATERIAL AND METHODS

Measurement of physical growth among children can be carried out using standardized technology applicable through out the world. The intellectual development and scholastic achievement of the children can also be assessed using appropriate tests standardized on local populations. The culture-appropriate tests, schedules and questionnaires included for assessing the study variables and the procedures and methods used for measuring them are described below:

2.1 Intellectual Development:

Several psychologists have defined intelligence. But the most widely and globally accepted definition of intelligence is the one by Wechsler (1975). It defines intelligence as “the global capacity of an individual to think rationally, to act purposefully and to deal effectively with one’s environment”. Intelligence is assessed by the use of intelligence tests, which are suitable for different age groups and are culturally appropriate.

The following culture-fair intelligence tests were found to be appropriate after literature survey and hence used in the present study:

- a) Binet-Kamat Intelligence Test for Indian Children
- b) Draw-a Man test
- c) Ravens Coloured Progressive Matrices

2.2 Anthropometry:

In the present study, standard anthropometric techniques were used for the assessment of nutritional status. The anthropometric measurements included both height and weight of

study children. The height and weight of children was measured using standard equipment, which included height rod for measuring height and the Tansi scales for measuring weight.

2.3 Assessment of Age:

In rural areas, accurate information on the chronological age of the child is difficult to obtain in the absence of birth certificate. The information is of utmost importance as both height and weight as well as intellectual assessment is dependent on the accurate information regarding the age of the child. The problem of obtaining the correct ages at the community level is largely mitigated by using a local events calendar, which can guide the calculation of age to the nearest month (Thimmayamma and Naidu, 1974). In the present study the ages of the children were calculated using a local events calendar prepared for the purpose.

RESULTS AND DISCUSSION

The results emerging from the analysis of the study variables are presented in this section. Means and standard deviations computed for intellectual test scores and scholastic achievement according to nutritional status and other variables are presented with levels of significance wherever obtained by applying appropriate tests.

3.1 Distribution of children:

Table 1 presents the distribution of children according to their erstwhile beneficiary and control group status in relation to school enrollment, school dropout and other details.

Table 2. Distribution (%) of Erstwhile Beneficiaries and Control Children According to Age and Gender.

Age Groups	Study Groups				Total
	Erstwhile Beneficiaries		Erstwhile Controls		
	Boys	Girls	Boys	Girls	
7+ years	41.9 (83)	34.3 (68)	12.6 (25)	11.1 (22)	(198)
8+ years	48.6 (52)	20.6 (22)	17.8 (19)	13.1 (14)	(107)
9+ years	29.5 (18)	26.2 (16)	22.9 (14)	21.3 (13)	(61)
Total	(153)	(106)	(58)	(49)	(366)

Figures in parenthesis indicate numbers studied.

Table 3. Distribution (%) of Erstwhile Beneficiaries and Control Children According to Binet-Kamat IQ Categories.

Study Groups	IQ Categories			Total
	80-89 (Dull)	90-110 (Average)	111-120 (Above Average)	
Erstwhile ICDS Beneficiaries	23.2 (60)	69.1 (179)	7.7 (20)	259
Erstwhile Non-ICDS Controls	58.9 (63)	41.1 (44)	0 (0)	107

Figures in parenthesis indicate numbers studied.

Table 3a. Distribution (%) of Erstwhile Beneficiaries and Control Children According to Draw-A-Man IQ Categories

Study Groups	IQ Categories			Total
	80-89 (Dull)	90-110 (Average)	111-120 (Above Average)	
Erstwhile ICDS Beneficiaries	19.3 (50)	70.6 (183)	10.1 (26)	259
Erstwhile Non-ICDS Controls	61.7 (66)	37.4 (40)	0.9 (1)	107

Figures in parenthesis indicate numbers studied.

From the earlier cohort of 690 children, 13 percent (48) belonging to the erstwhile ICDS group against 40.4 percent (130) from the erstwhile non-ICDS had never enrolled in the primary school. The school dropout rate of children from the ICDS group was also lower (12.5%) compared to the non-ICDS group (24.8 %).

The observation that higher percentage of (73.7%) enrollment and lower percentage of (12.5%) dropouts in the ICDS group (compared with non-ICDS group) in this study was in strong agreement with the studies by Sunderlal (1981), Paranjpe (1983-85), Tarapore (1986) and Chaturvedi (1987) who reported that the preschool education resulted in higher enrolment and fewer dropouts in the primary school.

Among the 381 school children, 366 were attending primary schools located in the original study villages. Of these, 73.7 per cent (259) were erstwhile ICDS beneficiaries who had received preschool education and 34.1 per cent (107) were erstwhile non-ICDS control group children. These 366 children were available in the same villages at the time of psychological testing and formed the sample for the present study. Fifteen school children had migrated to other villages.

3.2 Age and gender wise distribution of children

The sample for the present study consisted of a total of 366 rural school-going children aged between 7-9 years. The children were located in 28 villages spread out in three mandals namely Srikalahasti, Yerpedu and Thottambedu in Chittoor district of Andhra Pradesh. The distribution (%) of the children in the two study groups according to gender and age groups with yearly intervals is presented in Table 2. The number of children in the two groups is not equal. The reason for this is that the same number of children studied in the earlier study (Vazir and Kashinath, 2000) was followed in the present study and the sample size in both groups originally was unequal.

The data in the above table clearly indicates that the percentage of boys and girls in the erstwhile beneficiary group were higher in all the age groups when compared with the percentages of boys and girls in erstwhile control group. Also, irrespective of beneficiary and control status, the

Table 3b. Distribution (%) of Erstwhile Beneficiaries and Control Children According to Raven's Percentile Classification.

Study Groups	Percentiles				
	≥ 95 th Superior	75 th –24 th Above Average	25 th –74 th Average	10 th –24 th Below Average	≤ 9 th Impaired
Erstwhile ICDS Beneficiaries	1.9 (5)	9.3 (24)	75.3 (195)	12.7 (33)	0.8 (2)
Erstwhile Non-ICDS Controls	0.0 (0)	4.7 (5)	41.1 (44)	46.7 (50)	7.5 (8)

Figures in parenthesis indicate numbers studied.

percentage of boys enrolled in schools was higher than the percentage of girls in all age groups.

This finding that enrolment of boys was higher than that of girls was in agreement with the studies by Sunderlal (1981), Haughton & Haughton (1995), Colclough & Lewin (1993) King & Hill (1992) and Herz and Khandker, (1991) who observed that a gap in primary school enrollment between girls and boys exist indicating lower enrollment of girls than boys.

The factors such as employment prospects and mothers' education are lower, and where girls are more likely to have other responsibilities like housework and childcare are responsible for this gender gap especially in rural areas.

3.3 Classification of children according to IQ categories

The classification of children according to the IQ categories of the Binet-Kamat test is given in Table 3. This IQ categorization is used by almost all well-known tests.

The above classification indicates that 69% of children in the ICDS exposed group had normal average IQ compared to only 41% in the non exposed group. In fact, nearly 60% in this group had below average IQ falling in the dull category, compared to 23% in the ICDS exposed group ($P < 0.01$). Among the erstwhile ICDS beneficiaries, nearly 8% had above average IQ. None of the control children had IQs above the average.

The classification of children according to the IQ categories of the Draw-a man test is given in Table 3a. This IQ categorization is used by almost all well-known tests. Phatak's scoring system was used for calculating DAM IQs.

The above classification indicates that 70.6% of children in the ICDS exposed group had normal average IQ compared to only 37.4% in the non exposed group. In fact, nearly 61.7% in this group had below average IQ falling in the dull category, compared to 19.3% in the ICDS exposed group ($P < 0.01$). Among the erstwhile ICDS beneficiaries, nearly 10.1% had above average IQ whereas 0.9% of the control children had IQs above the average.

The Raven's Coloured Progressive Matrices test is based on the percentile classification. The distribution of the study children according to this classification is given in Table 3b.

It is evident from Table 3b that higher percentages of intellectually superior (1.9) and above average children (9.3) belonged to the erstwhile ICDS group compared to the erstwhile non-ICDS (0.0 and 4.7 percent respectively). Even in the intellectually average category, the percentage of erstwhile ICDS children was significantly higher (75.3) compared to the erstwhile non-ICDS (41.1). Conversely, a higher percentage of children from the erstwhile non-ICDS group were found in the below average (46.7) and intellectually impaired categories (7.5) compared to the erstwhile ICDS (12.7 and 0.8) group. These findings indicate that the exposure to the ICDS programme can stimulate intellectual growth.

3.4 Mean intellectual scores of children according to age and study groups

For assessing intelligence, it is very important to use a battery of tests that can measure the various abilities comprising the IQ. The mean intellectual scores of the erstwhile ICDS

Table 4. Mean Intellectual Scores of Erstwhile Beneficiary and Control Boys and Girls According to Age groups.

Study groups	Age Groups					
	7-8 years		8-9 years		9+ years	
	Boys	Girls	Boys	Girls	Boys	Girls
<i>DAM-IQ</i>						
Erstwhile Beneficiaries	102.1± 11.09 (83)	101.4± 11.40 (68)	98.5± 10.92 (52)	93.8± 8.90 (22)	97.1± 9.14 (18)	91.9± 7.55 (16)
Erstwhile Controls	93.8± 9.37 (25)	91.2± 9.58 (22)	90.6± 5.86 (19)	89.5± 5.00 (14)	89.4± 7.41 (13)	88.3± 7.79 (14)
<i>BK-IQ</i>						
Erstwhile Beneficiaries	99.0± 8.35 (83)	96.4± 9.30 (68)	96.4± 8.52 (52)	92.0± 9.63 (22)	94.3± 11.15 (18)	92.1± 10.15 (16)
Erstwhile Controls	93.9± 8.31 (25)	87.7± 6.53 (22)	88.0± 6.20 (19)	85.0± 4.26 (14)	88.7± 6.76 (13)	86.8± 6.80 (14)
<i>CPM- IQ</i>						
Erstwhile Beneficiaries	52.7± 15.35 (83)	46.6± 18.55 (68)	49.6± 20.84 (52)	43.6± 26.75 (22)	36.1± 20.42 (18)	43.3± 23.72 (16)
Erstwhile Controls	31.1± 21.95 (25)	27.8± 20.21 (22)	26.4± 20.77 (19)	21.0± 17.33 (14)	27.1± 18.51 (13)	22.3± 21.15 (14)

Figures in parenthesis indicate numbers studied.

beneficiary and non-ICDS control boys and girls in the three age groups obtained by using three culture-appropriate tests are given in Table 4.

The tests used were Binet-Kamat Intelligence Test for Indian children (BK), Draw-a-man (DAM) test adapted by Phatak and Raven's Coloured Progressive Matrices (CPM-tile) for children. The three tests are culturally appropriate and measure different sets of intellectual abilities as well as some similar abilities. The performance on a battery of tests gives the subject a chance to reveal the direction of his or her intellectual potential.

Results obtained by administration of the Draw-a-man and Binet-Kamat intelligence tests indicated that the erstwhile ICDS beneficiaries achieved significantly higher mean IQ scores ($P < 0.001$) compared to the erstwhile non-ICDS controls across the three age groups. It is also clear

from the above table that although there are no statistically significant gender differences in the intellectual scores across age groups, the trends are in favour of boys in all the age groups.

It is also evident from Table 4 that there are significant differences between age groups and gender with younger children attaining higher IQ scores than the older and boys attaining higher IQs compared to girls. In the original study of the same cohort of children also, it was found that older children performed poorly compared to younger children on the test of psychosocial development (Vazir and Kashinath, 1999).

Factors explaining the variation in the IQ of the study children were analyzed using the Logistic Multiple Regression Models. The various abilities constituting the BK IQ were analyzed additionally to find out which of them is more significantly higher or lower between the study

groups, gender and between age groups. Results on eight abilities of the BK IQ test indicate the following:

1. Speed of Response

Significant differences ($p < 0.001$) in this ability were found between the age groups with the older children attaining higher scores compared to the younger (103.7 vs 105.8 vs 106.6). Since the items measuring this ability are progressively difficult according to the age levels, this finding is appropriate. No significant differences were observed between study groups and gender.

2. Memory

Results indicated significant differences ($p < 0.04$ and $p < 0.003$) between study groups and age groups (96.5, 100.9 and 106.5 respectively for erstwhile ICDS 7+, 8+ and 9+ vs 94.4, 94.0 and 102.2 respectively for erstwhile Non-ICDS 7+, 8+ and 9+). No differences between gender regarding this ability were found.

3. Perception of Form

Regarding this ability, significant differences ($p < 0.002$) were observed between the study groups (90.8 vs 85.1 respectively for erstwhile ICDS and Non-ICDS) but no significant difference was seen either among the age groups or gender.

4. Comprehension

Similar to Speed of Response, significant differences ($p < 0.003$) were seen between age groups (77.5, 84.6 and 87.6 respectively for 7+, 8+ and 9+ years). These findings are logical in that as age increases, the ability to comprehend more difficult concepts also increases. No significant difference was observed either among the study groups or between the genders.

5. Sensation

This ability like Memory was also significantly different ($p < 0.03$, ($p < 0.001$)) between the study groups and between age groups (102.5, 115.6 and 117.3 respectively for erstwhile ICDS 7+, 8+ and 9+ vs 81.6, 109.4 and 116.8 respectively for erstwhile Non-ICDS 7+, 8+ and 9+). There was no significant difference between genders.

6. Similarities

This ability also was significantly different ($p < 0.001$, $p < 0.01$) between study groups and between age groups (90.0, 91.6 and 96.4 respectively for erstwhile ICDS 7+, 8+ and 9+ vs 77.4, 86.1 and 88.0 respectively for erstwhile Non-ICDS 7+, 8+ and 9+). There was no significant difference between genders.

7. Reasoning

This ability was not significantly different between any of the study variables indicated above.

8. Judgment

This ability also was not significantly different between any of the study variables indicated above.

The results indicated above point out that the abilities such as memory, perception of form, sensation and similarities are significantly higher among the erstwhile ICDS beneficiaries compared to erstwhile Non-ICDS control children. The programme content seems to stimulate these abilities more than others. These abilities, especially memory may be significantly associated with school achievement. Some of the earlier studies reviewed on this topic (Miller, 1984, Khosla, 1984-86, Sahni, 1984) have collected detailed data on specific abilities constituting intelligence in this age group. Studies by Agarwal et al (1987) on rural 6 to 8 years old boys and girls found some gender differences with boys performing better than girls and a few other studies (Muralidharan *et al.*, 1974; Khosla 1984-86, Paranjape 1983-85) on the benefits of the ICDS programme on IQs of ICDS exposed and unexposed children were elucidated. The study by Chaturvedi (1983) found significantly higher intelligence test scores among the erstwhile ICDS beneficiaries of 6-14 years age compared to the IQ scores of age matched children in the non-ICDS area, adequately concurred with the above results.

The results presented indicate that the ICDS program has a long-term impact on the intellectual status of beneficiaries three years after they had left the program and had joined formal school. The follow-up of the erstwhile control group (unexposed to ICDS but sharing the same socio-economic and socio-cultural environment) in school

indicated significantly lower intellectual development compared to the erstwhile ICDS beneficiaries. These long-term effects of the ICDS need to be fitted into a cost-benefit analysis of the programme because they are likely to throw up rich dividends, which had hitherto remained hidden.

It is recommended that the ICDS is universalized to include all the under-privileged children and that the quality of teaching in schools situated especially in backward rural areas is improved.

Conclusion

The ICDS programme is globally recognized as one of the world's largest and most comprehensive community-based outreach systems for promoting early childhood care for survival, growth and development. It has been evaluated by several institutions for its effects on growth, nutritional status and cognitive and school achievement.

The study was conducted with the overall objective to assess the long-term impact of the ICDS on scholastic achievement and intellectual development of school going children between 7-9 years of age who had earlier been exposed to the programme.

The variables included in the study were intelligence (using the Binet-Kamat Intelligence test for Indian children, Draw-a-man test, Raven's Coloured Progressive Matrices), scholastic achievement (using NCERT scales), socio-economic status of the family (Narayan Rao's Rating Scale) and nutritional status (using anthropometric measurements). The performance of the two study groups on these variables was analyzed using appropriate statistical procedures. Bivariate analysis was done initially to detect significant variables which were later fitted into stepwise multiple regression analysis to study their interactions and contribution in explaining the variation in the intelligence and scholastic achievement of the children.

Results indicated that the erstwhile ICDS beneficiaries achieved significantly higher mean IQ scores ($P < 0.001$) compared to the erstwhile non-ICDS controls across the three age groups. Although there were no statistically significant gender differences in the intellectual scores across

age groups, the trends were in the favour of boys in all the age groups.

Significant differences were observed between age groups and gender with younger children attaining higher IQ scores than the older and boys attaining higher IQs compared to girls.

The various abilities constituting the BK IQ were analyzed additionally to find out which of them was more significantly higher or lower between the study groups. Results on eight abilities of the BK IQ test indicated that six abilities, including speed of response, memory, perception of form, comprehension, sensation and similarities were significantly different between the two study groups. The erstwhile ICDS beneficiaries attained significantly higher scores ($p < 0.001$) on these abilities compared to their erstwhile non-ICDS counterparts.

Comparison of the original study DQs of the ICDS beneficiaries and non-ICDS controls and their present study IQs indicated that both the erstwhile beneficiary and control groups attained significantly lower IQs ($p < 0.05$) in all the age groups. Although DQ and IQ are measures of quite different skills and abilities, they are indicative of the growing capacities of individuals. Although the present study results found erstwhile beneficiaries attaining significantly higher IQs compared to the erstwhile controls, both groups over a period of three years performed poorly on intellectual tests compared to their past attainment on psychosocial developmental test. The differences were found to be significant at 5% level of probability. It is possible that the school environment of these children was not as stimulating for intellectual development as was their earlier non-formal environment in the Anganwadis for their psychosocial development. The Perry Preschool program and the Head Start in the U.S.A. also found similar results of the follow up of the children from the non-formal preschool through formal school.

The study findings show that the ICDS program has a beneficial long-term impact on intellectual development. These long-term effects of the ICDS need to be fitted into a cost-benefit analysis of the programme because they are likely

to throw up rich dividends, which had hitherto remained hidden.

In view of its long-term benefits, it is recommended that the ICDS be expanded further to include all the under-privileged children. Keeping in view the importance of newer and innovative information in stimulating intellectual development and possibly scholastic achievement, it is also recommended that the quality of teaching in rural schools be improved.

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