The Child Development Index

The aim of the CDI is to contribute toward formulation and monitoring of public policies for children in Brazil, in pursuit of the Millennium Development Goals

Child development and human development are complex concepts, the dimensions of which are sometimes difficult to express in the form of an index. The idea of creating a Child Development Index (CDI) arose from the need to promote and develop public policies targeted toward children in the first six years of life, the period in which the major portion of their cognitive, emotional, and social skills, and physical development as individuals, takes place.

The CDI thus provides another instrument, for the formulation and monitoring of public policies targeted toward early childhood, that Brazil can use in its pursuit of the commitments assumed under the United Nations Millennium Declaration of 2000. This declaration contained the Millennium Development Goals (MDGs), which the 191 Member-states of the United Nations pledged to achieve by 2015. When applied at the municipal level, the CDI is particularly useful for mobilizing resources and political will, in line with the processes of decentralization and 'municipalization' of policies and services targeted toward child development.

The Millennium Declaration and the MDGs were based upon a series of international agreements and legal instruments, including the Convention on the Rights of the Child, the principles and content of which are reflected in Brazil's Statute of the Child and Adolescent. The MDGs that relate to children were adapted and incorporated into the Child Friendly President's Plan, launched by the Brazilian Government in 2003.

The UN Convention and Brazil's Statute acknowledge that children are the subjects of rights, irrespective of race, color, sex, language, religion, political opinion, national or social origin, economic or birth status; that all children have the right to health and survival, full development and protection against all forms of discrimination, exploitation and abuse; and that children have the right to healthy lives and to full development during early childhood. This implies that governments have a responsibility and obligation to offer access to high-quality services, and that families must be committed to protecting and caring for their children during this special phase of their development. Neither should it be overlooked that, under the terms of Brazil's Federal Constitution, such duties are not born solely by governments, and that the responsibility for caring for children must also be shared by the family and the community.

From this perspective, CDI incorporates variables relating to: the supply of health services; the supply of education services; and the care and protection that the family provides for children in their early years (represented by the schooling levels of the father and the mother).

CDI 2004 can be compared to CDI 1999, thereby enabling verification of the degree of progress achieved by states and municipalities

over the period. Aside from presenting the rating of each municipality on statewide and national scales, it enables the identification of those that have made the greatest strides, and verification of best practices for public policies associated with such advances.

THE CONCEPTS OF CHILDHOOD AND OF CHILDREN'S RIGHTS

Changes in contemporary society have resulted in revised attitudes toward childhood. Now considered an essential stage in the process of the building of citizenship, current attitudes reflect evolution in the light of changing social realities. Throughout the world, governments, international agencies, and civil society organizations acknowledge the need for policies targeted toward childhood, and especially ensuring their rights in this early phase of life.

Recent studies on early childhood have generally concentrated on infant mortality, nutrition, health, and the relationship between children, families, and poverty. It is the family that provides the environment in which the survival, development, and integral protection of the child are ensured, regardless of family structure. It is a consensus among specialists that the first years of life are characterized by rapid and significant physical and mental development. It is in this period that the bases for future cognitive and emotional capacities are laid down. Such is the context that justifies the importance now attributed to early-childhood education services which, by complementing the role of the family, help foster the child's physical, emotional, cognitive, and social development.

Not only is education for children at this stage of the development cycle a right of citizenship; it is also an essential element for ensuring dignified lives for each and every child. Ensuring the right to education in high-quality daycare centers and public preschools constitutes one of the most important elements for the building of a more egalitarian society. Indeed, increasingly, early-child-hood education is recognized as the initial step in the schooling process. This is the central premise of the 1990 World Declaration on Education for All, approved in Jontien, Thailand, which states that education begins at birth. Ten years later, among the goals established at the World Forum on Education, in Dakar, Senegal (2000) were expansion and enhancement of welfare assistance and early-childhood education, especially for more vulnerable and underprivileged children.

This accounts for the importance recently attributed to health, welfare assistance, and education of children in the first years of life, and the acknowledgement of the crucial importance of this phase for the integrated development of the psychic potentialities of individuals which, according to the Ministry of Education's National Education Plan (PNE, 2001), encompass not merely their intellectual and cognitive dimensions, but also their emotional balance and sociability, essential aspects for their development as individuals and citizens.

In this context, it is worth recalling the concept of integral protection, enunciated in the Statute of the Child and Adolescent. This proclaims the right to development and sociability of the child as a citizen, implying the fulfillment of certain fundamental rights, namely:

• The right to life and to health, which require policies to foster healthy and dignified development. This involves expansion of prenatal care programs, support for breastfeeding, nutritional support for expectant and nursing mothers, specialized services for the disabled, and protection against ill-treatment.

• The right to freedom, respect, and dignity, which entails not only recognition that children are beings undergoing development, in compliance with rights ensured by the Constitution and by laws, but also the effective fulfillment of such rights. Particularly pertinent is Article 16, which provides for the right to play, engage in sports, and to have fun.

It is nonetheless necessary, when seeking to ensure respect for children's rights, to acknowledge that many children live in adverse conditions and precarious circumstances, ranging from exploi-

ANALYSIS OF THE RESULTS

Prior to embarking upon an analysis of the results revealed by the CDI, some thought should be devoted to the medium and long-range planning of policy goals for children, taking into account the demographic structure of the Brazilian population. To this end, initially, the proportion of the Brazilian population comprised of children up to the age of 6 years needs to be determined.

Children up to the age of 6 years as a proportion of the Brazilian population

Recent statistics reflect change underway in the age structure of the Brazilian population. The two most evident trends are a decline in the share of children and youths; and an increase in the proportion of elderly people. According to IBGE, in 1980 children below the age of 6 years accounted for 18.9% of the population; in 1991 this share had declined to 15.9%; and by 2000 to a mere 13.6%. This process can be attributed to a series of interrelated factors, including intense urbanization, plummeting fertility rates, technological advances in the communications media, and a massive increase in the numbers of women on the labor market which, in turn, has spurred burgeoning demand for early-childhood care services.

In Brazil, there are a total of 23 million children in the 0-to-6-year age bracket. As a proportion of the entire population, the share of this age group is higher in the North and Northeast than in other regions. In the States of Amapá, Roraima, Acre and Amazonas, in the least developed region of the country, children in this age group account for roughly one fifth of the total population. This indicates a need on the part of governmental organizations to pay especial attention to states in the North region. Indeed, historically, fertility rates in the North region have always been higher than in other parts of Brazil.

Comparison between CDI 1999 and CDI 2004

A comparison of CDI ratings referent to 1999 with those of 2004 shows that, in the intervening period, conditions have improved significantly, since the value leapt from 0.61 to 0.67, an increase of almost 10%. Nonetheless, similarly

Summary of procedures for calculation and processing CDI
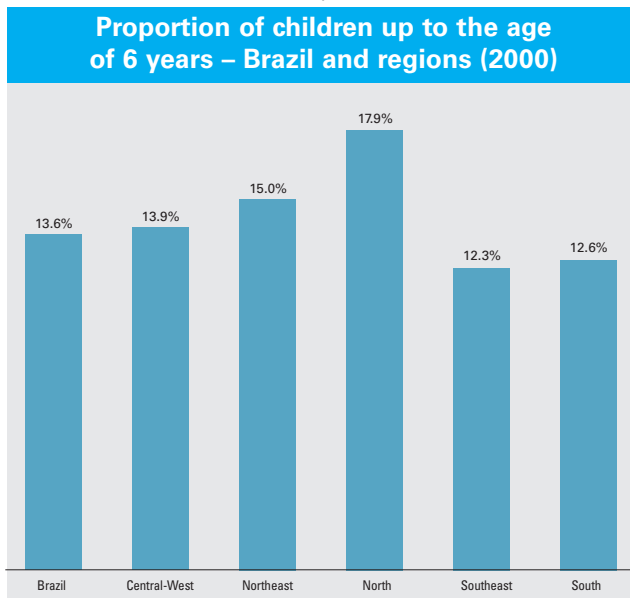
Review of CDI indicators

Discrepancies were detected in the values and data-validation used and disclosed in 2001. It was thus decided that CDI 1999 should be recalculated to enable comparison with the 2004 ratings. Furthermore, a change was effected in the formula for calculating the Ministry of Education/INEP indicators for 'percentage of children up to the age of 3 years enrolled in daycare', and the Ministry of Health's indicator for 'percentage of children vaccinated against measles'. The percentage of 4-to-6 year-old children in preschools was maintained; whereas the measles indicator was dropped in favor of the percentage of children vaccinated with DTP (1999) and tetramune (2004) which then became part of the CDI calculation in response to a recommendation from the Ministry of Health, in view of its greater representativeness. The data was sent specially to UNICEF by Ministry of Health.
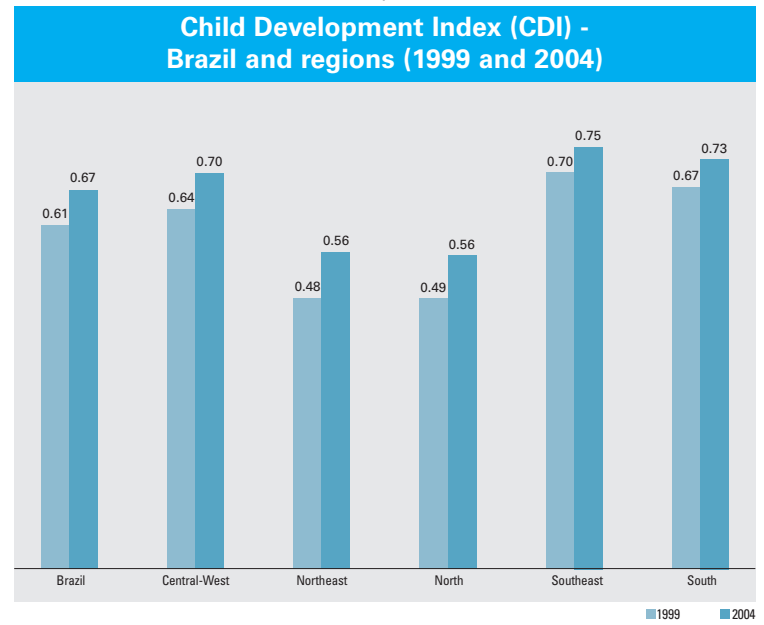
It should be observed that indicators relating to low schooling levels of parents were recalculated for 1996, since it was not possible to validate the calculations disclosed for the CDI 1999.

Graph 1

Proportion of children up to the age of 6 years – Brazil and regions (2000)

13.6% Brazil
13.9% Central-West
15.0% Northeast
17.9% North
12.3% Southeast
12.6% South

Source: IBGE, Population Count 1996 and Population Census 2000.

Graph 2

Child Development Index (CDI) - Brazil and regions (1999 and 2004)

Brazil 0.61 / 0.67
Central-West 0.64 / 0.70
Northeast 0.48 / 0.56
North 0.49 / 0.56
Southeast 0.70 / 0.75
South 0.67 / 0.73

■1999 ■2004

to Brazil's Human Development Index (HDI) classification, this figure is considered to reflect a 'medium' level of child development.

When broken down by region, CDI values reflect the historical background of Brazil's socioeconomic development. In the favored regions of the North and the Northeast, the rating is significantly lower than the national average. In these two vast regions, the improvement was more expressive than in the rest of the country, with increases of around 15%. The progress this reflects can be attributed to social policies that have brought benefit to families and children living in the poorest regions. In the Southeast and South regions, where CDI reflects what is regarded as a 'medium' level of development (0.75 and 0.73, respectively), the regional ratings are far higher than the overall national rating. Prior to examining the CDI ratings the Brazil's states and municipalities in detail, it is important to understand the indicators of which it is comprised.

Low schooling levels of parents

In order better to understand CDI, each of its component indicators needs to be examined. The consensus among specialists is that the schooling levels of the heads of households or persons responsible for the family has a substantial effect on the well being of the children. From a socio-educational standpoint, the likelihood of children's going to school is conditioned by the cultural environment of the family. The socio-cultural conditionalities of parents are constantly reflected in evaluations of government programs aimed at promoting equality of schooling opportunities, and the positive influence of 'education-friendly families' is always stressed as being generally more important for promoting educational development among children than any factor emanating from within the schools.

It is also a consensual view that the family is the ideal environment for human development, as has been reiterated in numerous international documents and, in Brazil, in the Federal Constitution and in the Statute of the Child and Adolescent.

From this standpoint, when examining the proportion of children up to the age of 6 years that live with a mother or father with up to three years of schooling (considered low), it becomes possible to gauge the vulnerability of children in this age group, since their situation closely relates the educational resources of their families.

The two Brazilian regions with the highest CDI levels are those in which schooling levels of par-

Table 1

Regions	Father		Change		Mother		Change	
	1996 (a)	2000 (b)	(b/a)*100-100	(b-a)	1996 (c)	2000 (d)	(d/c)*100-100	(d-c)
Brazil	**37.1%**	**32.3%**	**-12.9%**	**-4.8%**	**32.6%**	**27.8%**	**-14.7%**	**-4.8%**
Central-West	28.7%	25.0%	-12.9%	-3.7%	24.1%	20.2%	-16.2%	-3.9%
Northeast	59.8%	53.2%	-11.0%	-6.6%	50.4%	44.2%	-12.3%	-6.2%
North	50.5%	44.6%	-11.7%	-5.9%	44.8%	38.6%	-13.8%	-6.2%
Southeast	23.5%	20.1%	-14.5%	-3.4%	22.0%	18.2%	-17.3%	-3.8%
South	21.5%	17.4%	-19.1%	-4.1%	20.7%	16.9%	-18.4%	-3.8%

Proportion of children up to the age of 6 years whose caregivers have low schooling levels (1996-2000)

Source: IBGE, Population Count 1996 and Population Census 2000.

ents are highest. In 2004, whereas in the South and Southeast the percentage of fathers with no more than three years of schooling was 17.4% and 20.1% respectively, in the North this proportion was more than double (44.6%) and in the Northeast the situation was even more alarming, given that the majority of fathers with children in this age bracket had no more than three years of schooling (53.2%). When examining the schooling levels of mothers of children up to the age of 6 years, the same regional tendency is apparent, even though women tend to have slightly higher schooling levels than men.

Since these indicators influence the structure of the calculation of CDI, the results reflect better well being for children living in the South and Southeast. It should be stressed, however, that whereas between 1999 and 2004 there was a decline in the proportion of low-schooling fathers and mothers, in percentage terms this decline was greater in the Northeast and in the Central-West regions; followed by the North region. Falling proportions of low-schooling parents was most certainly a factor that influenced improvement in CDI in these regions.

Unquestionably, 'low schooling levels on the part of heads of households' undermines basic attributes of the sustainable human development paradigm currently promoted by the United Nations Development Programme (UNDP):

- Development of people (in this case, of children up to the age of 6 years), in terms of increasing opportunities, potentialities and the right to choose.

- Development for people to expand active participation of individuals and of communities in the development process, of which they are (at the same time) subjects and beneficiaries.

Preschool enrollments

Access to preschools is a child's right, enshrined in the Brazilian Constitution, and ratified in the National Education Plan (PNE). Since the 1980s, international academic research has increasingly stressed the beneficial effects of early-childhood education on the future life prospects of the child, and the need for governmental policies to cater of early-childhood education.

Figures on the proportion of children from 4 to 6 years of age enrolled in preschools reveal a significant increase, from 44.4% in 1999, to 55.1% in 2004, which corresponds to a 24.1% increase, influenced, principally by higher enrollment rates in the North and Northeast regions. Undoubtedly, school enrollment rates among this contingent of the population have improved, though they are still far below the targets set in 1990 at the World Conference on Education For All.

Preschool enrollment rates are higher in the North and Northeast regions. According to specialists, this is due to the launching, since 1985, of municipal-based socio-educational programs that have effectively increased preschool enrollments. Meanwhile, in the South, for example, economic and cultural realities are such that, within the home, children tend to be better prepared

prior to entering early-childhood education. Furthermore, in the South, most 6-year-old children are enrolled in primary schools. This is because, even before the launching of the National Education Plan (PNE), many municipalities, in response to provisions of the Guidelines and Bases for National Education Law (LDBEN) of 1996, allowed enrollment of 6-year-old children in primary schools. One of the effects of the Fund for the Maintenance and Development of Primary Schooling and Enhancement of the Status of Teachers (FUNDEF), was that many municipal administrations actually reduced their support for early-childhood education programs, since they were induced to target municipal-budget funding toward primary schooling (i.e., children 7 to 14 years of age). A Bill proposes to increase the period encompassed by primary schooling (from 8) to 9 years, and will tend to bring greater numbers of 6-year-olds into primary schools.

With regard to school-enrollment rates for 4 to 6 year-old children, the National Education Plan (PNE 2001) stipulates the following targets: 60% of children in the 4 to 6 years (or 4 and 5 years) age group enrolled by 2006; and 80% by 2011. It will be a great challenge for Brazil to meet these targets, and current projections indicate that only the Southeast region is likely to achieve them.

Earlier studies published by UNICEF, IBGE and UNESCO have shown that family income is, unquestionably, one of the factors that most influence children's school-enrollment levels. When school-enrollment levels are plotted alongside monthly family incomes, a clear disparity between children of higher and lower purchasing-power families becomes apparent; i.e., as family incomes rise, so do school-enrollment levels.

On average, children from 4 to 6 years old belonging to more affluent families are 60% more likely to be enrolled in schools than those of the poorest quintile. There are, however, other factors that may influence such rates, among them: the number of people living in the same household as the child, the schooling levels of the parents, the status of the child in the household (son/daughter, other relative, or non-relative) and the mother's work load.

Public policies must thus take into account the social and economic conditions of families and the places where they live, in view of the fact that family incomes and the scarcity of public funding in most municipalities end up reinforcing disparities and denying democratic access to early-childhood education.

Adequate prenatal coverage

Another indicator of great relevance for the composition of the CDI is the number of prenatal-care sessions attended. According to the World Health Organization (WHO), prenatal care is a set of medical, nutritional, psychological, and social interventions aimed at protecting mothers and their offspring throughout pregnancy, delivery, and puerperium, with a view to reducing maternal and infant mortality. Ideally, mothers should initially attend prenatal-care sessions at four-week intervals, in order to assess their overall condition, blood pressure, and uterine growth, and the heartbeat and movements of the fetus. After the 36th week, the mother should be examined at weekly or fortnightly intervals.

One of the indicators for calculating the CDI is the proportion of mothers that attend over six

Table 2

Children 4 to 6 years old enrolled in preschools (1999 and 2004)			
Regions	1999	2004	Change
Brazil	**44.4%**	**55.1%**	**24.1%**
Central-West	35.6%	46.2%	29.8%
Northeast	42.1%	57.1%	35.6%
North	34.2%	46.5%	35.7%
Southeast	52.1%	60.7%	16.5%
South	39.6%	45.6%	15.1%

Source: Ministry of Education (MEC), 1999 and 2004.

prenatal care sessions. This was the benchmark set by the Pan-American Health Organization (PAHO) and the Ministry of Health, with the aim of ensuring that expectant mothers are submitted to the necessary (blood and urine) tests to detect and treat any infections, and of immunizing the fetus against such diseases as neonatal tetanus. In view of the importance of prenatal care in avoiding perinatal mortality (which accounts for practically half of infant deaths in Brazil) and maternal deaths, this indicator, alongside vaccination coverage, is regarded as being of extreme relevance for ensuring the survival of children in their first year of life.

For Brazil as a whole, the percentage of expectant mothers that receive adequate prenatal care increased by 5.7 percentage points between 1998 and 2002, rising from 43.1% to 47.8%. The greatest advances were recorded in the Southeast, South and Central-West regions, whereas in the Northeast the rate remained practically constant. The most outstanding advances in prenatal care coverage took place in the Southeast region, where the increase was practically double that observed in all other regions of Brazil over the same period. In the North region, by contrast, there was a substantial (8.6 percentage-point) decline in services for expectant mothers.

It is probable that the decline in coverage in the North and the failure to advance in the Northeast can be attributed to weaknesses in the provision of public-health services in these two regions. The greater supply of public-health services in the Southeast, South and Central-West, where families with small children enjoy better socioeconomic conditions and can, in many cases, afford to seek prenatal care in private health facilities, helps explain why prenatal coverage for pregnant women in these regions is comparatively better.

Unquestionably, a woman's schooling level is one of the factors that determines the likelihood of her receiving adequate prenatal care. The more years of schooling, the greater her awareness of the health services to which she has a right (namely: over six prenatal care sessions with a doctor during the course of the pregnancy; all the necessary tests; and access to all relevant information) to ensure a tranquil pregnancy, delivery, and postpartum.
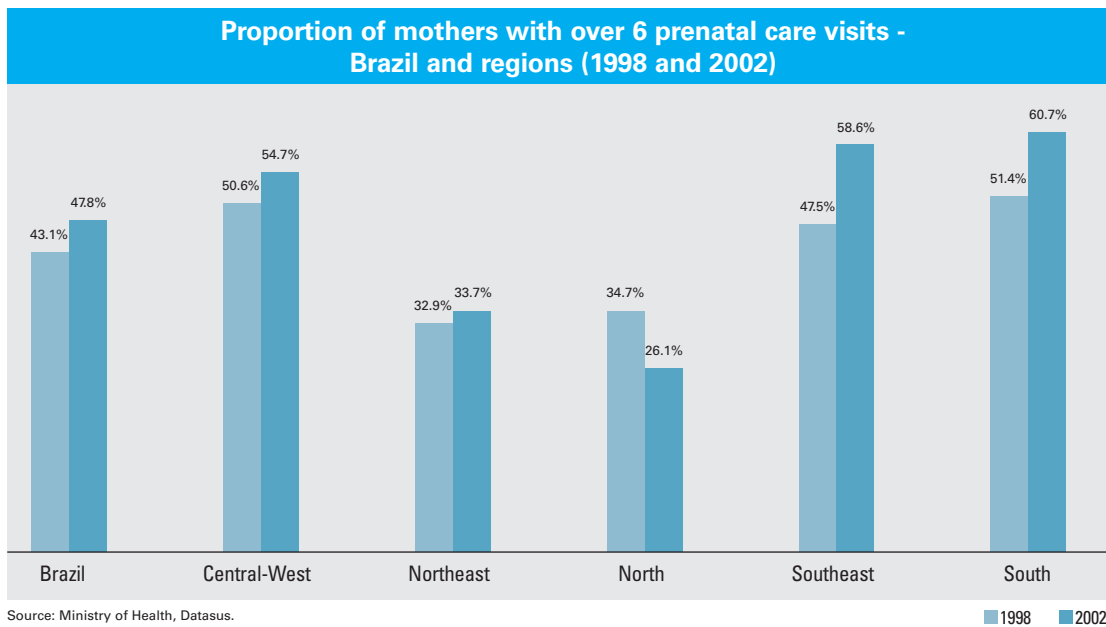
Recent studies indicate that healthy child development is intimately linked to the forming of a strong bond between the mother and the child, beginning during pregnancy and especially during the first year of life. According to Winnicott (1978), a baby does not exist alone, but is essentially part of a relationship established early on, during pregnancy. In the light of the perception that formation of this bond is the key to development of the individual, and in view of the knowledge that such bonding begins during pregnancy, proper prenatal care for mothers takes on increasing importance.

Pregnancy comprises a period of physical and psychological preparation that is often accompanied by an array of sentiments that imbue the mother with the strength needed to adjust to her new role. Aside from aspects of physical health, emotions are determining factors for the well being of the expectant mother. Pregnancy is a propitious period for conducting interventions aimed at preparing the mother for delivery, for breastfeeding, for caring for the child, as well as prevention and early detection of problems.

To this end, it is important that the mother have the necessary emotional strength and enjoy ready support of the family, and of social-welfare, hospital, and community-based services. Such a support network, targeted at protecting the mother and providing a protective environment in which to prepare for the baby's arrival, needs to be identified, assessed, and enhanced. It is thus important that more effective public-health policies be implemented in the North and Northeast, since only a third of all mothers in these regions attend the minimum recommended 6 prenatal care visits.

Maternal and child health are still fraught by serious and avoidable problems. Despite progress achieved in combating such threats as infectious childhood diseases, malnutrition,

Graph 3

Proportion of mothers with over 6 prenatal care visits - Brazil and regions (1998 and 2002)

	Brazil	Central-West	Northeast	North	Southeast	South
1998	43.1%	50.6%	32.9%	34.7%	47.5%	51.4%
2002	47.8%	54.7%	33.7%	26.1%	58.6%	60.7%

Source: Ministry of Health, Datasus.

■ 1998   ■ 2002

unsafe deliveries, and low birth weight, these remain the causes of over one third of child deaths worldwide, and almost half of all deaths in low and middle-income countries.

Immunization

Immunization provides an excellent example of a relatively low-cost intervention involving the family, the community, and the public-health services. Furthermore, it has an enormous impact upon child development, given that it ensures the health of children as they grow, by protecting them from dangerous diseases.

For various decades a worldwide struggle to combat common but serious diseases has been aided by safe and highly-effective vaccines, including the triple vaccine DTP (diphtheria, tetanus and pertussis), and tetramune, made up of DTP and Hib (Haemophilus influenzae type b). According to the World Health Organization (WHO) homogeneous application of these vaccines on a large percentage of children throughout Brazil (90% or more) may control or eliminate the diseases against which they were developed.

Up until 1970, when the National Immunization Program (PNI) was created, only a small portion of children were vaccinated in Brazil. This Program organized and rationalized conser-

vation and distribution of vaccines throughout the country. As a result of this effort, by the late 1990s, coverage rates had increased significantly. Nationwide, the goal in 1999 was to provide coverage for over 90% of children. Nonetheless, as Table 3 shows, in the North and Northeast coverage rates fell well below this target (75.6% and 88.7% respectively), thereby indicating a need for greater efforts to protect the health of children in these two regions.

In 2004, tetramune vaccine coverage levels rose throughout the country, thus attaining the goal of reaching practically all children below the age of 1 year throughout Brazil. This achievement was most expressive in the North region, where coverage rates leaped from 75.6% to 92.1%, or almost 22% over a five-year period. This favorable development is due to comprehensive vaccination campaigns carried out in recent years.

These higher tetramune vaccination coverage rates in the North region enable more children to enjoy healthy lives, and are one of the most significant contributions toward higher CDI 2004 ratings in that region. However, vaccination coverage is an indicator that relates only to access to vaccination, and does not bring any information on the quality or variety of health-care services available in each of Brazil's states.

DTP and tetramune immunization, for children below the age of 1 year (1999 and 2004)			
Region	DTP (1999)	Tetramune (2004)	Change
Brazil	**94.5%**	**96.2%**	**1.8%**
Central-West	96.8%	100.0%	3.3%
Northeast	88.7%	93.6%	5.5%
North	75.6%	92.1%	21.6%
Southeast	100.0%	96.9%	-3.1%
South	93.7%	100.0%	6.7%

Source: Ministry of Health, 1998.

CDI IN THE STATES

In keeping with the trend reported at the regional level, CDI 2004 shows that all of Brazil's states underwent improvement in relation to CDI 1999. The State of São Paulo stands out as the only Brazilian state in the 'high child-development' category, with a CDI rating of 0.80. The Federal District is on the verge of attaining this category, with a CDI rating of 0.78. Nearly all the other states had CDI ratings in the 'medium child development' category (ranging between 0.78 in the Federal District, to 0.52 in Acre). Only the State of Alagoas, with a CDI rating of 0.50, fell into the 'low child development' category. It is worth recalling the importance of education in the human development process, since in Alagoas, in 2004, one third of the adult population was illiterate, and 45% had no more than four years of schooling, corresponding to functional illiteracy.
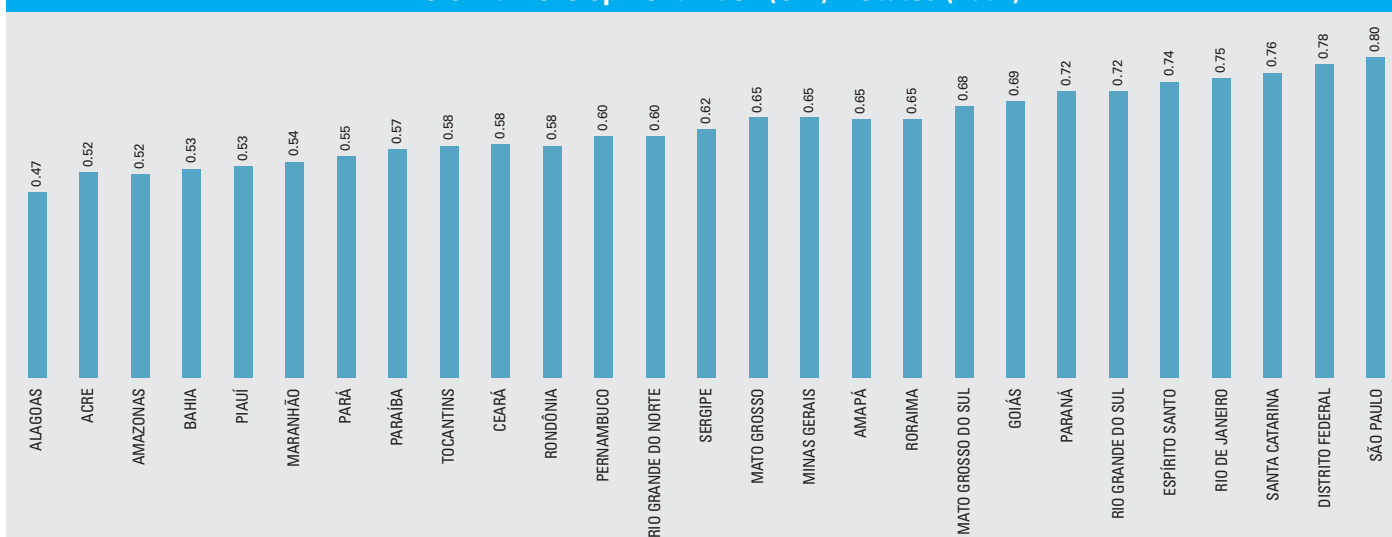
CDI AT THE MUNICIPAL LEVEL

In 1999, almost 40% of Brazil's municipalities had CDI ratings below 0.50, and were thus in the 'low child development' category. In 2004, 25% (or roughly 1,350) of Brazil's municipalities remained in this category. Currently, some 3,650 municipalities are in the 'medium child development' category, whereas only 560 have CDI ratings over 0.80, thereby placing them in the 'high child development' category.

FINAL CONSIDERATIONS

Between 1999 and 2004, Brazil's overall CDI rating improved significantly, especially as a consequence of improvements in the North and Northeast regions, which reported drops in the numbers of heads of households with low school-

The Child Development Index (CDI) – States (2004)

State	CDI
ALAGOAS	0.47
ACRE	0.52
AMAZONAS	0.52
BAHIA	0.53
PIAUÍ	0.53
MARANHÃO	0.54
PARÁ	0.55
PARAÍBA	0.57
TOCANTINS	0.58
CEARÁ	0.58
RONDÔNIA	0.58
PERNAMBUCO	0.60
RIO GRANDE DO NORTE	0.60
SERGIPE	0.62
MATO GROSSO	0.65
MINAS GERAIS	0.65
AMAPÁ	0.65
RORAIMA	0.65
MATO GROSSO DO SUL	0.68
GOIÁS	0.69
PARANÁ	0.72
RIO GRANDE DO SUL	0.72
ESPÍRITO SANTO	0.74
RIO DE JANEIRO	0.75
SANTA CATARINA	0.76
DISTRITO FEDERAL	0.78
SÃO PAULO	0.80

ing levels, and increased tetramune vaccination coverage.

Despite advances in the legal framework over recent years, in the North and Northeast regions, great challenges remain to be overcome. Coverage of social-welfare and education services for children up to the age of 6 years is far from adequate for meeting the standards required by Brazilian society.

The degree of well being and of vulnerability of children is closely related to the schooling levels of their parents, and to family purchasing power. Thus, an analysis of the situation of children must entail a socioeconomic assessment of the situation of Brazilian families and of the weaknesses of governmental initiatives aimed at expanding the supply of places in schools and improving healthcare services, especially in the less developed regions, and for the children of the poorest families..

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Child Development Index (CDI)
Brazil, by municipality

1999
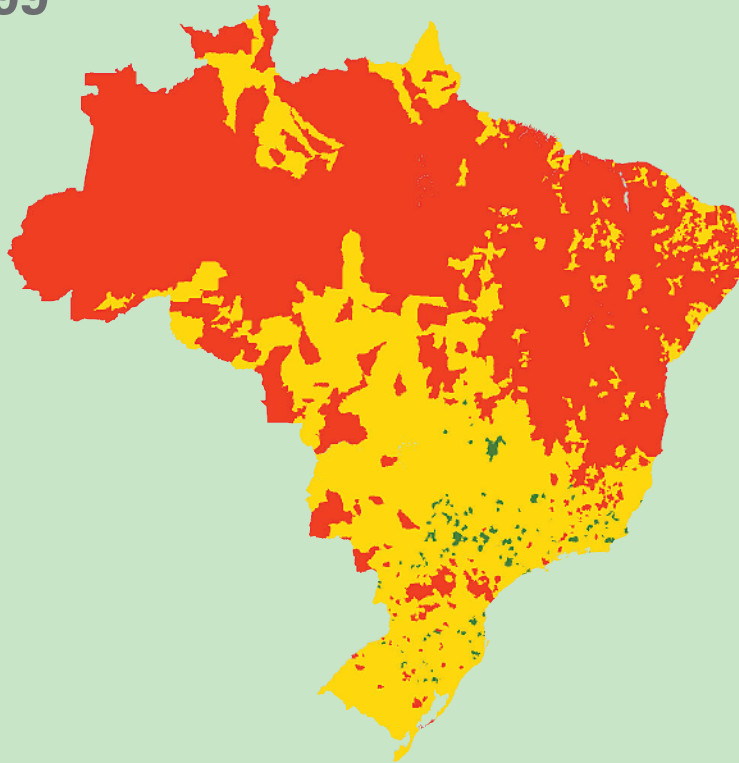
2004
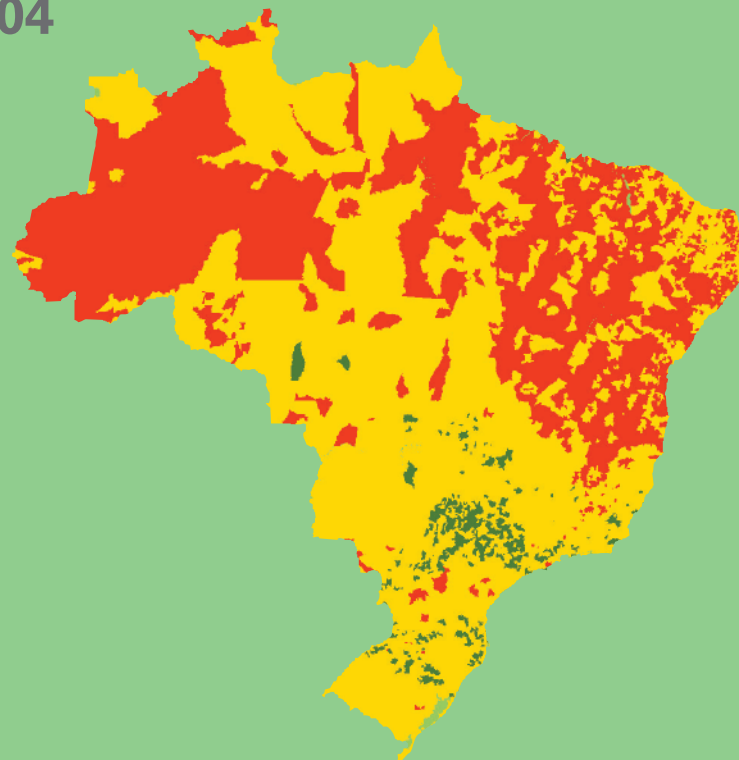
Below 0.50

Between 0.50
and 0.80

Above 0.80

Composition of the CDI

• Percentage of children below the age of 6 years living with mothers that have low schooling levels (I_{CMEP}): defined as mothers with less than four years of schooling, below which level they are regarded as functionally illiterate. Thus, the higher the percentage of children below the age of 6 years whose mothers have low schooling levels, the worse the classification of the municipality in terms of child development. Data were obtained from the Population Count of 1996, and from the Population Census 2000, both conducted by IBGE.

• Percentage of children below the age of 6 years whose fathers have low schooling levels (I_{CPEP}): although the schooling level of the father is relatively less important than that of the mother, in terms of care-giving and development in the child's early years, it is nonetheless a factor of extreme relevance. Since the years of schooling of the head of household determine, to a great extent, the wage level and thus the family income, by taking into account the schooling levels of both parents, the CDI encompasses levels of consumption of material goods available to the child within the family environment. Data were obtained from the Population Count of 1996, and from the Population Census 2000, both conducted by IBGE.

• Vaccination coverage among children below 1 year of age – DTP (1999) and tetramune (2004) (I_{Tetra}, I_{dtp}): these two indicators measure the percentage of children below 1 year of age immunized against diphtheria, pertussis and tetanus (DTP or triplex), against diphtheria, pertussis, tetanus, meningitis, and against other infections caused by Haemophilus influenzae type b (tetramune or DTP+Hib). Vaccination coverage is determined by dividing the number of children below 1 year of age that were immunized, by the total number of children in the same age group over a given period of time. Aside from indicating lower or higher morbimortality as a consequence of these diseases, vaccination coverage also indirectly reflects access to other maternal and child healthcare services. Obviously, since

this is a typical indicator of access and limited to vaccination, it is not possible to draw inferences as to the quality or variety of services available in the municipality for this age group. Data on DTP (1999) and tetramune (2004) coverage was provided by the Ministry of Health. In some cases vaccination coverage is over 100%, because the information relates to the numbers of doses, rather than the number of children vaccinated. In cases where the number of doses was greater than 100% of the estimated number of children, for the purposes of calculating the index, 100% coverage levels were considered.

• Percentage of mothers with adequate prenatal coverage ($I_{Prenatal}$): measures the percentage of live births to mothers who underwent over 6 prenatal care sessions, from the time they became aware that they were pregnant up until delivery. This measure was set by the Pan-American Health Organization (PAHO) and by the Ministry of Health, with a view to ensuring that mothers undergo the necessary testing (blood and urine) to assess their condition and that of the child, and to detect infections and immunize the fetus against such diseases as neonatal tetanus. In view of the importance of prenatal care for avoiding perinatal mortality (which accounts for practically half of all infant mortality in Brazil) and maternal deaths, this indicator, alongside vaccination coverage rates, is regarded as being of extreme relevance for assessing the chances of survival of children in their first year of life. This percentage is obtained by taking the total number of live births to mothers that underwent over 6 prenatal care sessions, divided by the total number of live births over the period. This information, obtained from the Department of Information and Informatics of the Unified Health System (Datasus), relates to 1998 and 2004.

• Gross preschool enrollment rates ($I_{Preschool}$): this indicator measures the percentage of children enrolled in (public or private) preschools, regardless of age. It provides a good approximation of the right of access of children

to this level of schooling. By indicating whether the supply of places is sufficient to attend to demand from the corresponding age group, this rate makes it possible to assess how many students are enrolled in schools that are inappropriate to their age. It is obtained by dividing the number of students enrolled in preschools, by the total number of children between the ages of 4 and 6 years. Ideally, the index would contemplate net preschool enrollment rates, which encompass only children in the age group for which such schools are officially targeted, however, this information is not available for the municipal level. Like overall immunization coverage, gross enrollment rates do not enable assessment

of the quality of education or of teaching practices. The figures relate to 1999 and 2004, and were provided by the Education Statistics System (Edudatabrasil) of the Anísio Teixeira National Institute for Education Studies and Research (INEP/MEC). It is important to note that this rate does not include students in literacy programs, since this modality of teaching is not regarded as part of the regular schooling system. It is targeted at children whose age should place them in primary schooling, but who have not as yet learned to read or write. Not including literacy classes in the CDI is an incentive for reducing this modality of teaching in favor of expanded preschool coverage.

Construction of the CDI

To combine the selected indicators into a single unified index, it was necessary to express them in comparable units. To this end, the values for each indicator were normalized on a 0 to 1 scale, where 1 corresponds to the best condition of child development, and 0 to the worst. For the purposes of comparison and interpretation, this is the same scale used to calculate the Human Development Index (HDI).

• Percentage of children whose mothers have low schooling levels: the most desirable percentage is 0 (i.e., no child below the age of 6 years should have a mother with a low schooling level). Municipalities that score or come close to scoring this value will have an index equal or close to 1. The minimum percentage is when 100% of children have mothers with low schooling levels. Municipalities in or close to this situation will have an index equal or close to 0.

• Percentage of children whose fathers have low schooling levels: the most desirable percentage is 0 (i.e., no child below the age of 6 years should have a father with a low schooling level). Municipalities that score or come close to scoring this value will have an index equal or close to 1. The minimum percentage is when 100% of chil-

dren have fathers with low schooling levels. Municipalities in or close to this situation will have an index equal or close to 0.

• Vaccination coverage (DTP and DTP+Hib): the most desirable percentage is 100 (i.e., all children should be vaccinated with DTP and DTP+Hib). Municipalities that score or come close to scoring this value will have an index equal or close to 1. The minimum percentage is when 0% of children are vaccinated. Municipalities in or close to this situation will have an index equal or close to 0.

• Percentage of mothers with adequate prenatal care coverage: the most desirable percentage is 100 (i.e., all expectant mothers attend more than six prenatal care sessions). The minimum percentage is when 0% of expectant mothers attend more than six prenatal care sessions. The closer the municipality is to the maximum or minimum score, the closer to 1 or to 0 its classification on the CDI.

• Gross preschool enrollment rates: for this indicator, the maximum or desired value is 100% of children between the ages of 4 to 6 years enrolled in this level of schooling. Thus, as in other cases, the minimum level is 0%. The closer the municipality is to the maximum or minimum value, the closer either to 1 or to 0 its CDI rating will be.

The CDI formula

$$Ii = Ii_{municipality} - Ii_{minimum} / Ii_{maximum} - Ii_{minimum}$$, in which:

Ii represents the indicators i =1,2,3,4,5, standardized between the values 0 to 1 for the entire set of the 5,507 municipalities existing in Brazil in 1996, or the 5,560 municipalities in 2000;

$Ii_{municipality}$ represents the value of indicator i = 1,2,3,4,5, in municipality m;

$Ii_{minimum}$ represents the minimum value established for indicator I = 1,2,3,4,5;

$Ii_{maximum}$ represents the maximum value established for indicator I = 1,2,3,4,5;

Once having normalized the values of the respective indicators on a 0 to 1 scale, they are then combined to obtain the CDI. The expression for their combination is as follows:

$$CDI = 0,25(I_{CMEP}) + 0,25(I_{CPEP}) + 0,25\left\{\frac{[(I_{DTP} \text{ ou } I_{Tetra}) + I_{Prenatal}]}{2}\right\} + 0,25(I_{Preschool})$$

According to the above expression, the CDI results from a weighted average of: indicators normalized for the percentage of children below the age of 6 years whose mothers have low schooling levels (I_{CMEP}), the percentage of children below the age of 6 years whose fathers have low schooling levels (I_{CPEP}), access to maternal and child healthcare services ($I_{Tetra} + I_{DTP} + I_{prenatal\ care}$), and access to education services ($I_{preschool}$). Since they are complementary, the health and education indicators were grouped and, as a set, account for 50% of the CDI. The indicators on parents schooling levels account for the other 50%. Undoubtedly, the weights adopted could be considered arbitrary and be discussed ad infinitum. Nonetheless, it should be considered that, in calculating the CDI, this degree of arbitrarity will equally affect all of municipalities.

It is also important to note that, unlike other indexes, the indicators selected to make up the CDI have a direct relation to the causes or problems that affect child development, and not merely with such indicators of effect or effectiveness, as prenatal or early-childhood mortality rates, malnutrition rates, preschool performance, etc. Aside from the availability and reliability of such data at the municipal level, another advantage is that discussion on strategies for intervention can address the real causes of specific problems (poor access to daycare, for example). When a result indicator, such as infant mortality or life expectancy is used, it is necessary to build a causal chain of effects, which may make the design of strategies and interventions and social control of goals more difficult, whereas coverage rates and supply of services are easily measured.

Interpretation and use of the CDI

- The CDI rating of a municipality ranges from 0 to 1, with 1 being the maximum value a municipality can aspire to in the quest to ensure survival, growth, and development for children in early childhood. The difference between the CDI of a given municipality and 1 indicates the challenges that must be met in order to reach these goals. A municipality with the maximum score reflects a situation in which all children below the age of 6 years live with parents that have over 4 years of schooling; the rights of mothers and children to basic healthcare are fulfilled; and the right to attend preschools is ensured.

- For the purposes of comparison and rating of municipalities, the same classifications used for HDI apply, i.e., CDI above 0.800 = high child development; between 0.500 and 0.799 = medium child development; and below 0.500 = low child development.

- The CDI should be interpreted alongside the indicators from which it is constructed. Since the CDI is a weighted average, it may conceal disparities, either among indicators or within a given indicator. For example, if the percentage of mothers that lack adequate prenatal coverage is high, it then becomes necessary to identify the groups most affected, their location, and size. Such identification will enable placing a focus upon the most vulnerable groups, the design of strategies for intervention, and estimation of the cost of resolving the problem. In line with the principle of non-discrimination, fulfillment of rights can not be compromised by differentiation, exclusion, restriction, or preferences based on race, gender, color, origin, socioeconomic status, political preference, ethnicity, or disability. It is thus important that the indicators that comprise the CDI be analyzed and broken down, taking into account such factors as gender, geographic area, ethnic origin, and socioeconomic group.

- Analyses of the indicators that comprise the CDI must be conducted from a holistic and non-sec-

toral standpoint. In line with the principle of indivisibility, the Convention on the Rights of the Child and the Statute of the Child and Adolescent set no hierarchy of rights, meaning that all rights are interrelated, and that each is equally important for the fundamental dignity of the child. The CDI and its indicators are a starting point for an integrated analysis of the problems afflicting early childhood, taking into account the nature of this phase of the child's development within the lifecycle. Such analyses, and the strategies proposed, should be multidisciplinary and multi-sectoral, and must take into account the physical, cognitive, and affective dimensions of the child in early childhood, within the family and community environments. From a planning standpoint, this does not necessarily mean that all rights can be secured at the same time. It is necessary to set priorities, bearing in mind the main threats to child development, and the opportunities for ensuring such rights.

- The mobilizing effect of the CDI, and of the subsequent design of strategies for promoting early-childhood welfare and education, ought to involve great numbers of social players, with a view to generating programs with high degrees of participation, especially on the part of mothers and fathers, entire families, communities, and governmental and non-governmental organizations. Such popular participation is essential for reaching an overall consensus as to the best approaches to problems, and for enabling the design of interventions and solutions that are appropriate, effective, and sustainable.

Aside from providing support in the setting of priorities for state and/or federal level programs, the CDI may also serve to identify successful initiatives in municipalities with higher ratings. Identification, evaluation, documentation, and dissemination of such successful experiences can provide essential inputs for the design of long-range comprehensive public policies.