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Brazil

Adult Health in Brazil: Adjusting to New Challenges

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SOCIAL INDICATORS: BRAZIL

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Principal Sources: World Bank (145, 186), IBGE (89), and Ramos et al. (123)

	1965	1973	1988	Reference Countries	
				Upper Middle Income	Industrial Market Economies
GNP PER CAPITA (Current US\$)	270	710	1,840	1,830	11,920
INCOME, CONSUMPTION AND POVERTY					
Energy consumption per capita (kg of oil equivalent)	296	589	781	1,960	4,893
% of private income received by:					
Highest 20%	60	67	—	50	23
Lowest 20%	4	2	—	4	6
Passenger cars/1,000 population	14	30	45	50	323
Newspaper circulation/1,000 population	31	39	—	25	538
HOUSING					
Average size of household					
Urban	—	5	4		
Rural	—	5	5		
% dwellings with electricity					
Urban	—	73	89		
Rural	—	13	21		
LABOR FORCE					
Total labor force (in millions)	27	35	51		
Female (%)	20	23	27	34	37
Agriculture (%)	49	44	31	29	7
Industry (%)	17	19	27	31	35
Participation rate (%)					
Total	32	36	37	39	47
Male	52	53	53	50	60
Female	13	17	20	28	35
EDUCATION					
Enrollment rates:					
Primary:					
Male	109	89	108	108	102
Female	108	87	99	101	101
Secondary:					
Male	16	24	31	64	89
Female	16	28	36	61	91
Pupils reaching grade 6 (%):	—	33	39	85	99
FOOD, HEALTH AND NUTRITION					
Per capita daily supply of:					
Calories	2,400	2,460	2,660	3,000	3,427
Protein (gms)	60	60	60	75	82
Population per physician	—	1.6	—	2.4	1.5
Population per hospital bed	—	0.2	—	0.4	0.1
% population with access to safe water:					
Urban	80	87	80		
Rural	—	57	51		
POPULATION AND VITAL STATISTICS					
Total Population (millions)	84	103	138		
Urban population (% of total)	50	59	72	65	75
Population growth rate (%/year)					
Total	—	2.5	2.3	2.1	0.7
Urban	—	4.7	3.8	3.6	1.5
Population density/sq km agricultural land	47	49	52	238	534
Population age structure					
0-14 years	44	43	38	36	21
15-64 years	53	54	58	59	67
65 and above	3	3	4	5	12
Crude birth rate (/1,000)	39	33	29	28	13
Crude death rate (/1,000)	11	10	8	8	9
Child death rate (/1,000)	15	11	5	4	0
Family planning users (% eligible women):	—	—	65		

SOCIAL INDICATORS: BRAZIL

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POPULATION AND VITAL STATISTICS: REGIONAL DISTRIBUTION

Population:

	Rural	Urban	Total
North	3.8	4.6	8.4
Northeast	17.8	23.5	41.3
Southeast	7.8	55.2	63
South	6.1	15.8	21.9
Center-West	2.3	7.5	9.8
BRAZIL	37.8	106.7	144.4

Fertility: Urban and Rural Total Fertility Rates

	1950	1960	1970	1980	1988	2000
Urban	4.7	--	4.5	3.0	--	--
Rural	7.8	--	7.5	5.8	--	--
BRAZIL	6.2	6.0	5.5	4.0	3.5	2.9

Mortality: Infant Mortality by Region

	1930/40	1940/50	1950/60	1960/70	1970/80	1988
North	168	152	117	111	72	--
Northeast	179	178	160	151	121	--
Southeast	163	134	100	100	75	--
South	127	114	87	87	62	--
Center-West	136	124	102	104	70	--
BRAZIL	158	145	118	117	68	65

Mortality: Life Expectancy by Region

	1940	1950	1960	1970	1980	1988
North	40.4	44.3	52.6	54.1	64.2	--
Northeast	38.2	38.7	43.5	44.4	51.8	--
Southeast	44.0	48.8	57.0	58.9	63.8	--
South	50.1	53.3	60.3	60.3	67.0	--
Center-West	48.3	51.0	58.4	58.0	64.7	--
BRAZIL	42.7	45.9	52.4	52.7	60.1	68.0

This study was prepared on the basis of missions to Brazil in 1988 and 1989 led by **John Briscoe** and including **Antonio Correia de Campos** and **Nancy Birdsall**. The study draws heavily on background papers prepared for the World Bank by the following Brazilian experts:

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ACRONYMS

AIDS – Acquired Immunodeficiency Syndrome
AIH – Atestado de Internacao Hospitalar; Hospitalization Certification
CETESB – Environmental Agency for the State of Sao Paulo
COLD – Chronic obstructive lung disease
CVD– Cardiovascular diseases
DATAPREV – Sistema de Dados; Social Security Institute Data System
FEEMA – Environmental Agency for the State of Rio de Janeiro
FUNDACENTRO – National Foundation for Occupational Safety, Hygiene and Medicine
FSESP – Fundacao de Servicos de Saude Publica; Foundation for Public Health Services
HMO – Health Maintenance Organization
HIV – Human Immunodeficiency Viruses
ICD – International Classification of Diseases
IBGE – Fundacao Instituto Brasileiro de Geografia e Estatistica; the Brazilian Census Bureau
INAMPS – Instituto Nacional de Assistencia Medica e Previdencia Social; National Institute for Medical Assistance and Social Security
INPS – Instituto Nacional de Previdencia Social; National Institute of Social Security
OECD – The Organization of Economic Cooperation and Development
PAHO – Pan American Health Organization
PNAD – Pesquisa Nacional por Amostra Domiciliar; National Household Sample Survey
QALY – Quality-adjusted-life-year
SABESP – Public Water and Sewerage Company for the State of Sao Paulo
SAC – Sistema de Apuracao de Custos; the cost accounting system developed in the State of Sao Paulo.
SIA-SUDS – Outpatient certification system developed by the State of Sao Paulo
SIAT – Sistema de Alta Tecnologia; High-Technology Medical System
SICAPS – Outpatient certification system developed by the State of Parana
SUDS – Sistema Unificado e Decentralizado de Saude; Unified and Decentralized Health System.
WHO – World Health Organization

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SAÚDE DO ADULTO NO BRASIL:

AJUSTANDO

A NOVOS DESAFIOS

**Divisão de População e Recursos Humanos
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RESUMO

Introdução

Atualmente o Banco Mundial apóia, no Brasil, importantes programas: de saúde materno-infantil, de doenças infecciosas e outros problemas básicos de saúde em áreas rurais do Nordeste e na periferia urbana de São Paulo; de combate à leishmaniose e à esquistossomose no Nordeste; e de combate à malária na bacia amazônica. O estudo aqui resumido aborda os "novos" problemas que o sistema de saúde do Brasil terá de enfrentar nas próximas décadas, à medida que a população envelhece e que o papel das doenças crônicas e degenerativas e da AIDS ganha em importância. Este enfoque não significa que tais problemas de "pós-transição" sejam "mais importantes" do que as outras questões de maior vulto, entre as quais as que são objeto dos atuais empréstimos do Banco Mundial ao setor da saúde no Brasil.

O estudo tem, isto sim, a seguinte motivação. O investimento em saúde do Banco Mundial no Brasil equivale tão somente a cerca de 1% do investimento total em saúde no Brasil. Ora, já que o objetivo dos seus empréstimos é melhorar a saúde (e não apenas promover bons projetos), é imperativo que o Banco Mundial também apóie os esforços do Brasil no sentido de melhor aplicar os demais 99%. Para tanto, o Banco Mundial considera importante pesquisar, em conjunto com os brasileiros, a operação atual do sistema de saúde, os novos desafios que o sistema enfrentará nas próximas décadas e o modo pelo qual poderá fazer frente aos mesmos.

O Brasil já é um país intensamente urbanizado, em que as doenças crônicas e degenerativas dos adultos são responsáveis pela maior parte dos óbitos, das doenças e das despesas relacionadas com o seu tratamento. Tal como documentado neste estudo, a importância epidemiológica e financeira dessas "novas doenças" se tornará ainda maior nas próximas décadas.

O estudo defende a tese de que as crescentes demandas de tratamento dessas "doenças de pós-transição" usurparão esforços que deveriam merecer prioridade máxima, tais como os de prevenção não só dessas "novas" doenças, como também de doenças "antigas" e ainda muito importantes. O estudo procura identificar as reformas que poderiam ser introduzidas tanto em termos de estratégias de prevenção como de políticas de financiamento, a fim de minimizar essas ameaças.

Cumprе mencionar também duas outras limitações deste estudo. Em primeiro lugar, no âmbito dos "problemas de pós-transição", o estudo aborda fundamentalmente as questões epidemiológicas e financeiras e atenta apenas transitoriamente para as importantes questões relacionadas como o desenvolvimento institucional e de recursos humanos. Em segundo lugar, o estudo não aborda toda a gama das questões relacionadas com a saúde dos adultos. A questão essencial dos serviços de saúde reprodutiva da mulher é o assunto de um futuro estudo correlato do Banco mundial. (167)

O contato: transformações profundas nas últimas décadas

Nas últimas décadas, o Brasil passou por transformações econômicas e políticas profundas e muito rápidas. Entre 1965 e 1980, o crescimento médio anual do PIB foi de 9% ao ano. A produção industrial aumentou à taxa média de 10% ao ano, ao passo que a participação da agricultura no PIB decaía de 19% para 11%. A proporção da força de trabalho agrícola baixou de 49% para 31% no mesmo período de 15 anos. Essas modificações também revestiram importante dimensão política. O "milagre econômico" do Brasil foi gerido por um governo militar autoritário e centralizado.

No fim dos anos 70, o futuro do Brasil mostrava-se risonho. O crescimento econômico mantinha-se forte e a democracia parecia estar à vista. Embora o Brasil continuasse a ser uma das sociedades mais desiguais do mundo, com 10% da população a concentrar 47% da renda total, naquela época muitos brasileiros consideravam a sua pátria como "o país do futuro".

O Brasil dos anos 80 muito pouco tem de reconhecível como produto da década do "milagre". A renda per capita praticamente não cresceu na década atual, e são muitos os desiludidos com o que a política pós-militar ofereceu. Os brasileiros descrevem corretamente a crise como algo mais do que uma mera crise econômica ou até mesmo econômico-política: trata-se de uma "crise moral", que abala os próprios fundamentos da organização social.

O presente estudo discute alguns dos desafios que a história lança ao setor da saúde no Brasil. A discussão baseia-se em duas premissas principais. De acordo com a primeira, a estrutura do setor da saúde e a filosofia que orienta o seu desenvolvimento só podem ser entendidas no contexto de realidades políticas e econômicas da sociedade. Assim com o perfil da nova sociedade ainda está se definindo, também as discussões sobre a estrutura do setor da saúde variam de anacrônicas recordações dos "bons tempos" até propostas idealistas de uma rápida transformação, em que serviços de alta qualidade sejam prestados a todos, segundo as respectivas necessidades. No setor da saúde, tanto quanto na sociedade em geral, "o antigo está morrendo e o novo não consegue nascer; neste interim, surge uma grande diversidade de sintomas mórbidos" (63). A segunda premissa é a de que, devido à rapidez e alcance das mudanças ocorridas em décadas recentes, é essencial uma perspectiva histórica para definir os desafios ora lançados e as respostas apropriadas.

As conseqüências para a saúde

As transformações econômicas havidas nas últimas décadas induziram transformações demográficas e epidemiológicas igualmente profundas. A migração interna foi maciça: a proporção da população urbana aumentou de 1/3 para 2/3 entre 1960 e 1980. A fecundidade caiu rapidamente: em média, a mulher de 1965 poderia esperar ter seis filhos durante a sua vida fértil; em 1985, tal expectativa não passava, em média, de pouco mais de três filhos. Os óbitos associados ao subdesenvolvimento também caíram extraordinariamente. As taxas de mortalidade infantil reduziram-se em mais de 40% entre 1965 e 1985, e os óbitos por doenças infecciosas e parasíticas

baixaram em cerca de 70% entre 1960 e 1980. A proporção de mortalidade atribuível a episódios cardíacos e vasculares, câncer e lesões, subiu de 38% em 1960 para 54% em 1986. Enquanto que estas antigas ameaças regrediram, novas surgiram.

Dentro de 30 anos, mais de 85% dos brasileiros viverão em áreas urbanas, o número de pessoas idosas terá dobrado, 10% da população terá mais de 65 anos, e as doenças cardiovasculares, o câncer e as lesões serão responsáveis por cerca de 74% dos óbitos. Até um certo ponto esta mudança é uma faceta inevitável e desejável de desenvolvimento. Contudo, quando comparado a outros países que se encontram ao mesmo nível de desenvolvimento, o corrente perfil de mortalidade no Brasil é atípico em certos aspectos. A proporção total de mortes devido a lesões é muito mais alta do que aquela que é típica em outros países, com aumento recente de homicídios acentuando este fator ainda mais. Calcula-se que daqui a 30 anos a epidemia de AIDS introduzirá uma significativa interrogação no futuro da saúde no Brasil. O Brasil tem já presentemente o terceiro maior número de casos de AIDS no mundo. Dados antropológicos e epidemiológicos sugerem que a epidemia vai alastrar rapidamente do grupo de alto risco --homossexuais-- para o resto da comunidade. A tendência epidemiológica é assustadora.

O caso especial dos pobres

A teoria-padrão da transição demográfica e epidemiológica sugere a existência, no Brasil, de dois grupos epidemiológicos distintos. As doenças não transmissíveis (cardíacas, câncer, lesões) seriam problemas dos ricos, ao passo que as tradicionais doenças infecciosas continuariam a ser o problema principal dos pobres. Tal quadro representa uma meia-verdade e é enganador. Trata-se de uma meia-verdade porque as doenças da "pós-transição" constituem, sem dúvida, o principal problema de saúde dos ricos, e porque os pobres continuam a sofrer em grande escala das "doenças antigas". Por exemplo: mais de 10% das crianças nascidas no Nordeste ainda não sobrevivem o seu primeiro ano; essa taxa de mortalidade infantil é superior à de muitos países da África e da Ásia. Contudo, o quadro é enganador porque, também no caso das "novas" doenças, as taxas são maiores entre os pobres.

Os pobres, que já não vivem principalmente nas áreas rurais, mas nos cortiços urbanos, estão sujeitos a riscos maiores por diversas razões. A maioria dos pobres vivem em lugares onde a poluição é a mais elevada, a proteção contra o tráfego é mínima e a criminalidade é alta. Muitas vezes, trabalham nas indústrias mais perigosas. Além disso, os fatores de risco individual são mais altos entre os pobres. Em Porto Alegre, por exemplo, uma recente avaliação dos fatores de risco de doença cardiovascular (tabagismo, consumo de álcool, hipertensão e obesidade) revelou que a probabilidade de alto risco de um adulto não educado era cinco vezes maior do que a de um egresso da escola secundária.

As conseqüências são previsíveis. Em São Paulo, os índices de mortalidade por acidentes de trânsito e homicídio são duas e cinco vezes respectivamente maiores entre os industriários e trabalhadores manuais do que entre profissionais liberais. Em Porto Alegre, os índices de mortalidade de adultos são duas vezes maiores em áreas pobres do que em áreas urbanas de classe média. Até mesmo a AIDS está passando a ser doença dos pobres: a proporção de vítimas com educação secundária caiu de 79% no período 1982-85 para 33% no período 1985-88.

O financiamento dos serviços de saúde

Antes de 1968, os serviços públicos de saúde no Brasil eram financiados principalmente pelos orçamentos gerais dos governos federal, estadual e municipal. Tanto o financiamento como a prestação de serviços de saúde no Brasil sofreram profundas alterações com a consolidação em 1968, do sistema de seguro social. Na década dos 70, o financiamento dos serviços de saúde pelo seguro social (administrado pelo Instituto Nacional de Assistência Médica e Previdência Social - INAMPS) passou a representar mais da metade do investimento público em saúde, que cresceu à média aproximada de 15% ao ano. Esses enormes incrementos de despesa foram usados para erigir um sistema que se concentrava pesadamente no pagamento, ao setor privado, da provisão de tratamento hospitalar aos trabalhadores dos setores formais da economia. A proporção do dinheiro público no setor da saúde, aplicada em serviços curativos, cresceu de 35% em 1965 para 85% no começo dos anos 80. Despesas em atividades da prevenção da doença e da promoção da saúde de adulto são muito baixas. Cerca de 70% de toda a despesa pública de saúde no Brasil é gasta em hospitais, proporção que é muito mais alta do que a de países industriais, e ainda mais alta do que a de outros países com renda per capita similar. Os gastos também se concentram pesadamente nas regiões mais desenvolvidas do país. No sul e no Sudeste, a disponibilidade per capita de leitos hospitalares e ambulatórios é duas vezes maior do que nas outras regiões.

Devido à importância das contribuições do seguro social, o financiamento da saúde no Brasil é vulnerável a oscilações do ciclo econômico. Em anos de recessão, as "contribuições" se reduzem paralelamente aos salários e ao emprego no setor formal, enquanto que as demandas de compensação por desemprego aumentam. O efeito da combinação destes fatores, combinados com um crescimento econômico lento, é de que a despesa per capita do setor público em saúde permanece mais ou menos constante na década dos 80.

As dificuldades de financiamento e o processo democrático exigem uma reforma na organização e financiamento dos serviços de saúde no Brasil. A culminação de vários anos de acirrada campanha é a estipulação dada pela Constituição de 1988 no sentido de que haja apenas um sistema de saúde custeado por recursos públicos, e de que grande parte do controle desse sistema seja descentralizada para os níveis estadual e local.

Por que é necessário agir:

O prognóstico do sistema de saúde do Brasil não é bom. Nas próximas décadas ocorrerão crescimentos explosivos na demanda de serviços, à medida que aumenta a idade da população e que é exercido o direito constitucional de tratamento gratuito e público para todos. O impacto financeiro dessas mudanças será forte, já que o custo do tratamento das "novas" doenças é maior do que o custo do tratamento das "antigas". Por exemplo: tipicamente, o custo de uma hospitalização por acidente vascular ou cardíaco no Brasil é quatro vezes maior do que o custo de uma hospitalização por infecção intestinal ou respiratória. As doenças cardiovasculares, o câncer e as lesões explicam 45% das baixas hospitalares e cerca de 55% dos custos de hospitalização dos pacientes. Sem um controle explícito, as despesas com serviços ambulatoriais de alto custo também poderão aumentar rapidamente. Em 1988, apenas quatro procedimentos de clínica externa de alto custo - hemodiálise, estudos hemodinâmicos, endoscopia e tomografia computadorizada - representaram 3% da despesa total do INAMP.

Calcula-se que só devido a mudanças demográficas e epidemiológicas o custo de saúde por pessoa no Brasil dobrará em termos reais durante os próximos trinta anos. Finalmente, a experiência dos países industrializados indica que a população incapacitada registrará aumento expressivo e potencialmente caro nas próximas décadas.

O atendimento de todas essas demandas exigirá a duplicação das despesas per capita em saúde, ou até mesmo a sua triplicação nas décadas vindouras! Já que isso é inviável, a implicação é de que haverá concorrência pelos recursos disponíveis. Enquanto a força propulsora do sistema público de saúde continuar a ser a resposta para a demanda expressa, o resultado será uma crescente despesa em serviços curativos de base hospitalar e alto custo, em benefício dos mais influentes. Como corolário, a menos que se implantem importantes reformas, cada vez menor será a despesa com os dois investimentos de prioridade mais alta: a prevenção eficiente em função do custo e a prestação de serviços aos pobres.

Melhoria de prevenção

A experiência dos países industrializados demonstrou, de modo inequívoco, ser impossível abordar com eficiência os problemas de saúde na "pos-transição" tão somente por meio de tratamento, seja qual for o seu grau de sofisticação. Conseqüentemente, a formulação de planos de eficiente prevenção dessas doenças "novas" representa importante tarefa de saúde no Brasil (e nas sociedades industriais).

Há três maneiras de simular a prevenção dessas doenças. Primeiro, por meio de atividades de promoção da saúde desenvolvidas pelo governo, por comunidades e por indivíduos, como é o caso da campanha de combate ao tabagismo, do Ministério da Saúde, e das de melhoria da saúde ocupacional, promovidas por sindicatos de São Paulo. Segundo, por meio de ações de proteção da saúde empreendidas por entidades e indústrias, tais como o programa do CETESB para a melhoria da qualidade do ar em Cubatão e da

melhoria das faixas para pedestres no Rio de Janeiro. E terceiro, por meio de serviços de prevenção individual prestados por assistentes de saúde, como é o caso do programa de triagem do câncer cervical em Campinas.

A Divisão Nacional de Doenças Crônicas e Degenerativas do Ministério da Saúde, bem como alguns governos estaduais (notadamente de São Paulo e do Rio Grande do Sul) têm envidado, nos últimos anos, significativos esforços no sentido de instituir programas de prevenção de doenças crônicas. Embora sejam importantes e mereçam todo o apoio, tais iniciativas têm sido de âmbito limitado. Dado o virtual equacionamento de "saúde" com "prestação de serviços individuais" no Brasil, tais esforços têm-se concentrado fundamentalmente nos cuidados preventivos proporcionados através do sistema de serviços de saúde. Tem sido relativamente pequena a atenção prestada às atividades de proteção e promoção da saúde.

De um exame de certas intervenções (bem sucedidas e malogradas) no Brasil, e de uma revisão da experiência nos países industrializados e de uma consideração dos prováveis custos e impactos de varias intervenções emergem certos princípios importantes para um programa de saúde preventiva no Brasil da "pos-transição":

- . cumpre atribuir prioridade máxima à redução dos riscos, consoante métodos que não dependam da discríção individual (tais como a proteção mais eficiente do pedestre no tráfego, a melhoria da segurança no lugar de trabalho e a melhoria da qualidade do ar); por esse motivo, o foco de atenção deveria ser a população, e não o indivíduo;
- . fundamentalmente, a atenção deve concentrar-se nos fatores de risco (incluindo o tabagismo, a alimentação inadequada, o consumo de álcool e drogas e a falta de exercício), e não na condição médica; por esse motivo, as intervenções fora do sistema de cuidados médicos serão freqüentemente as mais importantes; e
- . os programas devem orientar-se principalmente para a população pobre, bem como levar explicitamente em conta a sua situação; por esse motivo, cumpre atribuir papel proeminente às organizações que incluem membros pobres (sindicatos e entidades religiosas e comunitárias).

Tal perspectiva implica importantes reformas na ação de governo. As instituições do setor público aos níveis federal e estadual que se ocupam de questões tais como a promoção da saúde ocupacional, a segurança de produtos, a proteção ambiental, a segurança de drogas e alimentos, a segurança do tráfego e justiça criminal devem ser grandemente fortalecidas. Deve ser considerado o estabelecimento dum instituto federal para a promoção da saúde e a prevenção da doença, cujas funções incluirão:

- . acertar prioridades para a promoção da saúde e a prevenção da doença dentro do setor saúde e em outros setores relevantes (tais como a indústria e transporte);

- . estabelecer normas e diretrizes para atividades da promoção e prevenção;
- . trabalhar com, e prestar assistência técnica a, os secretários estaduais e municipais da saúde, assim como a outras entidades relevantes de outros setores;
- . fazer pesquisa aplicada para avaliar os custos e benefícios de ações de promoção e prevenção, e desenvolver modelos para programas custo-efetivos de promoção e prevenção.

Infelizmente, é provável que uma extrapolação da experiência dos países que se dedicaram a formulação de programas preventivos, em especial os destinados a atender os pobres, não seja apropriada. Conseqüentemente, o governo (federal, estadual e municipal) não pode, no Brasil, tratar adequadamente essa nova realidade sem desenvolver instituições flexíveis e inovativas, capazes de coligir e analisar dados, iniciar intervenções baseadas nesses dados, acompanhá-las e modificá-las como resultado das constatações.

Melhoria do financiamento:

No decurso das próximas décadas, os desafios centrais à formulação de uma política pública no Brasil incluirão: descentralização e democratização; redução do déficit fiscal, principalmente mediante a redução da despesa pública; e tratamento das "dívidas" econômicas, sociais e ambientais contraídas durante as décadas anteriores. Dadas a magnitude, a novidade e a complexidade desses desafios, parece que este processo de ajustamento continuará a ser lento e tortuoso.

Muitos profissionais da saúde no Brasil acreditam que "o pouco que se gasta em saúde" é o problema principal que o setor enfrenta. No Brasil, a despesa geral e pública em saúde (cerca de 5% e 2,5% do PIB, respectivamente) é típica de uma economia com o nível de PIB per capita do Brasil. Dado que o nível geral da despesa atual parece ser adequado, e já que o Brasil enfrenta um prolongado período de austeridade fiscal, é improvável que, a médio prazo, o governo aplique muito mais em serviços de saúde.

Contudo, o problema principal do setor da saúde do Brasil não é a falta de dinheiro, e sim, a aplicação iníqua, ineficaz e ineficiente dos adequados recursos disponíveis. Iníqua, porque são demasiados os recursos gastos com o tratamento curativo de base hospitalar, e muito pouco os aplicados em prevenção e cuidados básicos eficazes em função do custo. É inefetiva porque se gasta muito em "bens privados" (tais como tratamento curativo, que beneficia somente os usuários de tais serviços) e se gasta pouco em "bens públicos" (tais como informação sobre comportamento saudável e proteção ambiental, que beneficiam a sociedade como um todo). Há uma ligação íntima entre demasiadas despesas para as camadas privilegiadas e demasiadas despesas em bens privados. Portanto, mudanças no sentido de

equidade também implicariam mais efetividade (17). Finalmente os gastos são ineficiente, porque os sistemas de administração e recursos humanos, em virtualmente todos os níveis, são antiquados e improdutivos.

Será que há recursos para um pacote da prevenção intensiva? Apesar do falta da informações precisas sobre custos no Brasil, calcula-se que um programa inicial (que poderá incluir: campanhas contra o fumo, abuso de álcool e drogas, acidentes de trânsito e AIDS; atividades que promovem exercícios físicos; e uma campanha nacional de detecção precoce de câncer cervico-uterino) custaria somente 3% dos recursos públicos gastos em saúde.

Tal como no caso da prevenção, também não há solução fácil e de curto prazo para o financiamento dos serviços de saúde, nem "modelos" que, se seguidos, garantirão o sucesso. Até agora, nenhum país industrializado encontrou solução para o problema do financiamento das necessidades de saúde de populações que, à semelhança da do Brasil, estão envelhecendo, têm grande prevalência de doenças crônicas e degenerativas e acham ter direito aos benefícios de uma atenção médica sofisticada e dispendiosa.

Com base nas iniciativas parcialmente bem sucedidas em outros países, bem como nos modestos êxitos que o próprio Brasil registrou nos últimos anos, evidencia-se que uma resposta criativa ao financiamento dos serviços de saúde nas próximas décadas talvez deve incluir:

- . **Decentralização e um sistema transparente de transferência de recursos:** Dado que o sistema de saúde continuará sujeito a forças exógenas que escapam ao controle do sistema, será necessário torná-lo mais flexível para possibilitar ajustamentos inovativos rápidos a mudanças de circunstâncias externas. Importante componente dessa flexibilidade será a descentralização de grande parte da autoridade decisória, tal como previsto na Constituição. É essencial, também, que as transferências de recursos de saúde da União para os estados e deste para os municípios se tornem mais automáticas e transparentes. Prevê-se que as normas que governam tais transferências serão incluídas na lei complementar ora em discussão no Congresso.
- . **Melhor alocação de recursos.** O impacto das despesas públicas será maior se se gastar mais em atividades que sejam custo-efetivas para a promoção da saúde e prevenção da doença, e se gastar mais em serviços preventivos e curativos para os pobres.
- . **Atribuição de prioridade aos pobres.** Já que são os pobres os mais expostos e suscetíveis as "novos" riscos de saúde, e já que são eles os subservidos, tal realocação significará, necessariamente, uma reorientação dos recursos até agora destinados aos grupos servidos pelo sistema, para aqueles que pouco têm sido servidos. Trata-se de um processo inevitavelmente pontilhado de tensões políticas.

- . **Mobilização de recursos privados.** Dada a probabilidade de que os recursos públicos para a saúde permaneçam limitados, e visto que cumpre atribuir prioridade à prevenção aos pobres, será necessário mobilizar os recursos privados das classes média e rica a fim de complementar a disponibilidade de recursos públicos para lhes prestar serviços. É provável que eficientes entidades privadas de serviços de conservação da saúde desempenhem importante papel nesse processo.

- . **Racionamento.** Tão altos são os custos unitários de determinados procedimentos médicos que o seguro é uma característica universal dos sistemas de saúde nos países desenvolvidos; tais sistemas, tanto públicos como privados, protegem necessariamente o indivíduo contra custos calamitosos. Mas, uma vez minimizado o custo individual de procedimentos altamente dispendiosos, a procura desses procedimentos aumenta e a conta de satisfação do total das demandas individuais excede a disposição coletiva de pagar. Um racionamento dos cuidados médicos é, então, inevitável, mesmo em sistemas de financiamento privado. No Brasil, a procura do sistema de serviços de saúde aumentará em decorrência de modificações demográficas e epidemiológicas, na medida em que o acesso a serviços públicos de saúde passe a ser universal e na medida de novas disponibilidades altamente tecnológicas de tratamento. Conviria explicitar detalhadamente esse racionamento inevitável, já que o racionamento implícito fatalmente significará a atribuição de baixa prioridade aos necessitados.

- . **Uso de incentivos e técnicas administrativas modernas.** O interesse pela eficiência com que são aplicados os recursos públicos em saúde no Brasil só começou a manifestar-se nos últimos anos. Uma revisão da experiência dos países industriais, da América Latina e do Brasil sugere que o país concentrou-se em demasia nos controles normativos, e efetuou poucas experiências de melhoria de eficiência mediante a provisão de incentivos aos encarregados da prestação de serviços de saúde a aos seus usuários. A modernização administrativa requerida pelos serviços públicos de saúde no Brasil incluiria: a definição de métodos mais criativos e produtivos de trabalho conjunto como o setor privado, o desenvolvimento da capacidade de avaliação e administração da tecnologia de alto custo, e o desenvolvimento de modernos sistemas de administração de dados e recursos humanos. O INAMPS passou a empreender, em meados da década dos 80, certas ações úteis nesse sentido, e recentemente alguns dos estados deram alguns passos preliminares importantes rumo à modernização administrativa do sistema de prestação de serviços públicos de saúde.

EXECUTIVE SUMMARY

Introduction

The World Bank currently supports major Brazilian programs designed to improve maternal and child health and reduce infectious diseases and other basic health problems in the rural Northeast and urban periphery of Sao Paulo; and to control Chagas' disease, leishmaniasis and schistosomiasis in the Northeast; and combat malaria in the Amazon Basin. This study focuses on the problems which the Brazilian health system will face in coming decades as the population gets older, and as chronic and degenerative diseases and AIDS increase.

The focus in this report will be on the causes of mortality which become dominant in the latter stages of the epidemiologic and demographic transition. Although these problems -- such as cardiovascular diseases, cancers and injuries -- have existed for centuries in Brazil, they come into prominence as the epidemiologic and demographic transition is completed, and are referred to as "new" or "post-transition" problems in this report.

The focus on these problems does not imply that these they are more important than the other major challenges, including those addressed by current World Bank health loans to Brazil. Rather, the motivation for the study is as follows. World Bank lending for health in Brazil amounts to only about 1% of the country's total health expenditure. Since the objective of World Bank lending is to improve health (and not just to have good projects), it is imperative that the World Bank support Brazilian efforts aimed at spending the 99% more effectively, too. To do so, the World Bank deemed it important to investigate, with Brazilians, how the current health system operates, what new challenges it will face in the next few decades, and how it might deal with these challenges.

Already Brazil is a heavily urbanized country in which chronic and degenerative diseases and injuries among adults account for the majority of

deaths, sickness and illness-related spending. As documented in this paper, the epidemiological and financial weight of these new diseases will become much greater in the coming decades.

There is a danger that the escalating demands for treatment of these post-transition diseases will preempt those efforts that should be given highest priority, namely prevention of these new diseases and prevention of the still very important old diseases. The paper seeks to identify changes in preventive strategies and financing policies that could minimize this danger.

Two limitations in the scope of this study should be acknowledged. First, with respect to the post-transition problems, the study addresses primarily epidemiologic and financing issues, and pays only passing attention to the important issues relating to human resource development and institutional development. Second, the study does not address the full gamut of adult health issues. The vital issue of women's reproductive health services is the focus of a companion forthcoming study by the World Bank (197).

The Context: Profound Changes in Recent Decades

Brazil has undergone profound and very rapid economic and political changes in recent decades. Between 1965 and 1980, GDP grew at an average of 9% per annum. While industrial production rose at an average of 10% per year, the share of agriculture declined from 19% to 11% of GDP and the percentage of the labor force working in agriculture fell from 49% to 31% over the 15-year period.

There was also an important political dimension to these changes. The Brazilian "economic miracle" was directed by an authoritarian and centralized military government.

In the late 1970s, Brazil's future looked bright. Economic growth remained strong, and democracy seemed to be within sight. While Brazil remained one of the most unequal societies in the world, with 10% of the population accounting for 47% of total income, at the end of the 1970s many Brazilians considered Brazil "the country of the future".

The Brazil of 1989 is scarcely recognizable as the product of the "miracle" decades. Per capita income has hardly increased in this decade, and many are disillusioned with the post-military political dispensation. Brazilians correctly describe the crisis as more than simply an economic crisis or even an economic-cum-political crisis: It is a "moral crisis," in which the very foundations of social organization are uncertain.

This study discusses some of the challenges for the health sector that are the consequences of Brazil's recent past. The discussion is based on two principal premises. The first premise is that the structure of the health sector, and the philosophy which guides its development, can be understood only in the context of broader political and economic developments within the society. Just as the shape of the new society remains unclear to all, so too, discussions of the structure for the health sector range from anachronistic yearnings for "the good old days" to idealistic proposals for a rapid transformation to a system in which high-quality services are provided to all according to their needs. In the health sector, as in the society at large "the old is dying and the new cannot be born; in this interregnum there arises a great diversity of morbid symptoms"⁽⁶³⁾. The second premise of this study is that, because of the rapidity and depth of the changes in recent decades, an historical perspective is essential in defining current challenges and responses that might be appropriate.

The Consequences for Health

The economic changes of recent decades induced equally profound demographic and epidemiological changes. Internal migration was massive, with the proportion of the population living in urban areas increasing from one third to two thirds between 1960 and 1980. Fertility fell rapidly: In 1965 the average woman expected to have about six children in her lifetime; in 1985 she would expected to have just over three children. Deaths associated with underdevelopment also fell precipitously. Infant

mortality rates dropped by over 40% between 1965 and 1985, and death rates due to infectious and parasitic diseases declined by about 70% between 1960 and 1980.

As these "old threats" have receded, so "new threats" have arisen. The proportion of mortality attributable to cardiovascular diseases, stroke, cancers and injuries (including homicide) rose from about 38% in 1960 to 54% in 1986. To some extent this change reflects changes that are an inevitable and desirable part of development. However, when compared with other countries with similar life expectancies, Brazil's mortality profile in the mid-1980s was atypical in certain respects. Most strikingly, the proportion of total deaths due to injuries is much higher than would be expected, with the escalating homicide rates of recent years accentuating this abnormality still further.

It is projected that in 30 years over 85% of Brazilians will live in urban areas; the number of elderly will have doubled, with about 12% of the population aged 65 or older; and cardiovascular diseases, cancers and injuries will account for over 74% of deaths.

The AIDS epidemic introduces a major question mark into the future of health in Brazil. Already Brazil has the third largest number of reported AIDS cases in the world. Anthropologic and epidemiologic data suggest that the epidemic is likely to spread rapidly from the standard high-risk group -- homosexuals -- into the community at large. The epidemiologic trends are ominous.

The Special Case of the Poor

The standard theory of the demographic and epidemiologic transition suggests that two distinct epidemiological groups would be found in Brazil: Non-communicable diseases, (such as cardiovascular diseases, cancers and injuries) would afflict the rich, while infectious diseases would remain the principal problem of the poor. This picture is simultaneously half-true and misleading. It is half-true because the post-transition causes of death are, indeed, the major health problem for the rich, and because the poor do continue to suffer heavily from the "old", infectious diseases. For example, more than 10% of infants born in the Northeast still fail to reach their first birthday, a higher infant mortality rate than that in many African and Asian countries. The picture is

misleading, however, because the rates of most of the new causes of death are higher among the poor than among the middle class and the rich.

The poor, who now live primarily in urban slums rather than rural areas, are at higher risk from a variety of sources. In many instances, for example, they live where pollution is highest, where protection from vehicles is minimal, and where crime is high. And they often work in the most dangerous industries. Furthermore, individual risk factors are highest among the poor. In Porto Alegre, for instance, a recent assessment of risk factors for cardiovascular diseases (smoking, alcohol consumption, hypertension and obesity) found that an uneducated adult was 5 times as likely as a secondary school graduate to be at high risk.

The consequences are predictable. In Sao Paulo, death rates due to traffic accidents and murder are, respectively, two and five times greater for industrial and manual workers than for professionals. In Porto Alegre, adult death rates are twice as high in poor areas as in middle-class areas of the city. Even AIDS is becoming a disease of the poor: The proportion of AIDS victims with a secondary school education declined from 79% for the period 1982-85 to 33% for the period 1985-1988.

The Financing of Health Services

Before 1968 public health services in Brazil were financed primarily through the regular budgets of the federal, state and municipal governments and were administered by the federal Ministry of health, and by the state and local health secretariats. The financing and delivery of health services in Brazil changed profoundly with the consolidation and extension of the social security system in 1968. In the 1970s, social security financing of health care (administered by the National Institute for Medical Assistance and Social Security, INAMPS, separate from and independent of the Ministry of Health) came to account for over half of all public health spending, which increased an average of about 15% per year. These huge increases in spending were used to erect a separate health system. This system financed primarily personal and curative health services (as opposed to the Ministry of Health public health system). It concentrated heavily on paying the private sector for the provision of hospital-based treatment for those working in the formal sectors of the economy. The proportion of public money in the health sector spent on personal

curative services rose from 36% in 1965 to 85% in the early 1980s. Spending on activities for preventing disease and promoting health among adults is very low. About 70% of all public health spending in Brazil is spent on hospitals, a higher proportion than in industrialized countries and a much higher proportion than in other countries of similar per capita GDP. Spending is also heavily concentrated in the better-developed regions of the country. The per capita availability of hospital beds and outpatient facilities in the South and Southeast is more than double the availability in other regions.

Because of the importance of social security contributions, public health financing in Brazil is vulnerable to swings in the economic cycle. In years of recession, contributions decline with wages and formal sector employment, while the demands for unemployment compensation rise. Combined with slow economic growth, the net effect is that per capita public sector spending on health has remained about constant in the 1980s.

Financing difficulties and the democratic process have necessitated changes in the organization and financing of health services in Brazil. The culmination of years of bitter struggle is the stipulation in the Constitution of 1988 that there be just one publicly-financed health care system, bringing together the functions of the Ministry of Health and INAMPS, and that much of the control of this system be decentralized to the state and local levels. This is the Unified and Decentralized Health System (the SUDS).

Why Action is Needed

The prognosis for the Brazilian health system is bad. In the coming decades, there will be explosive increases in the demand for services as the population ages and as the Constitution-enshrined entitlement to publicly-financed treatment for all is implemented. The financial impact of these changes will be great since the cost of treating the new diseases is higher than the cost of treating the old diseases. For instance, the cost per hospitalization for a cardiovascular incident is typically four times the cost of a hospitalization for an intestinal or respiratory infection. Already cardiovascular diseases, stroke, cancers and injuries account for about 45% of the sick who are admitted to hospital, and about 55% of the costs of hospitalizing the sick. Without explicit control,

spending on high-cost ambulatory services could also escalate rapidly.

As the population gets older and as different types of illness predominate, health care costs will rise. We estimate that the cost of "staying in place" – providing the current quality of services to the currently-served proportion of the population – will double by 2020. To address the priority health needs – more spending on prevention, improving the quality of services, and covering a larger proportion of the population – will require much larger increases in health spending.

Will this "problem" be taken care of automatically by growth in per capita income and consequent growth in health spending? The answer is "no". Those whose incomes will increase most will probably be the better off. Like other Brazilians, they will be living longer and suffering more from chronic and degenerative diseases. They will want their increased spending on health to translate into higher quality personal services for them, not into more effective prevention and better services to the poor. Under the current system of public financing, and with the current program incentives favoring personal curative care, they would probably get what they want. Without changes in financing and program incentives, even large increases in health spending could leave the fundamental problems – too few resources for prevention and inequity – untouched.

Put another way, as long as the driving force of the public health system remains response to expressed demand, the result will be escalating spending on high-cost, hospital-based curative care for those with more influence. Improvements in prevention and in meeting the needs of the poor require that major changes be made in the way in which the health sector is financed and public priorities are set, even with substantial growth in per capita income.

Improving Prevention:

Experience in industrialized countries has shown unequivocally that the post-transition health profile cannot be dealt with effectively by treatment alone, no matter how sophisticated. Accordingly, a major health task in Brazil (and industrialized societies) is to devise effective schemes for prevention of these new diseases.

The list of potential interventions which would have a positive impact on health is very large. A key public policy task is to decide which of these interventions should be undertaken. This decision should be based on an analysis of the costs and benefits of different interventions.

There are several ways in which prevention of these diseases can be stimulated:

- health promotion activities undertaken by government, communities and individuals, such as the Ministry of Health's current anti-smoking campaign and ongoing union activity to improve occupational health in Sao Paulo;
- health protection actions taken by agencies and industries, such as the environmental protection agency of Sao Paulo State (CETESB) program for improvement in air quality in Cubatao, and the improvement of pedestrian crossings in Rio de Janeiro;
- preventive services delivered by health providers to individuals, such as the cervical cancer screening program in Campinas.

In recent years there have been significant efforts by the National Division of Chronic and Degenerative Diseases of the Ministry of Health and some state governments (notably Sao Paulo and Rio Grande do Sul) to initiate chronic disease prevention programs. Although these efforts are important and should be strongly supported, they have been limited in scope. Given the virtual equation of "health" with "the delivery of individual services" in Brazil, these efforts have focussed primarily on providing preventive services through the health delivery system. Relatively little attention has been given to health promotion and protection activities.

From an examination of some interventions (successful and unsuccessful) in Brazil, from a review of the experience in industrialized countries, and from a consideration of the likely costs and impacts of different interventions, some important principles emerge for a preventive health program in a post-transition Brazil:

- Highest priority should be given to reducing risks in ways that do not depend on individual discretion (such as protecting pedestrians more effectively from cars, improving safety in the workplace, and improving air quality); whence the focus should be on populations, not individuals;
- Focus should primarily be on risk factors (including smoking, poor diet, consumption of

alcohol and drugs, and lack of exercise) not on medical condition (such as hypertension); whence interventions outside of the medical care system will often be most important;

- Programs must specifically address the poor and must take explicit account of their situation; whence organizations that include the poor (such as unions and religious and community organizations) must be given a major role.

This perspective implies major changes in government action. Public sector institutions at the federal and state levels that deal with issues such as health promotion, occupational health, product safety, environmental protection, food and drug safety, highway safety and criminal justice should be greatly strengthened. Consideration should be given to the establishment of a federal institution for health promotion and disease prevention, whose mandate would be to:

- set priorities for health promotion and disease prevention activities within the health sector and in other relevant sectors (such as industry, transport and labor);
- establish norms and guidelines for health promotion and disease prevention activities;
- work with and provide technical assistance to state and municipal secretariats of health, as well as to relevant agencies in other sectors;
- conduct applied research to assess the costs and benefits of different prevention and promotion activities and to develop models for the cost-effective institution of disease prevention and health promotion activities.

Unfortunately, it is probably not appropriate to extrapolate from the experience of industrialized countries in devising preventive programs, especially those designed to reach the poor. Accordingly, government (federal, state and local) in Brazil cannot deal with this new reality successfully without developing flexible and innovative institutions capable of collecting and analyzing data, initiating interventions based on these data, monitoring the interventions and modifying them as a result of the findings.

Improving Financing

Over the course of the next several decades, the central challenges in formulating public policy in Brazil will include: decentralization and democratization; reduction of fiscal deficits primarily by reducing government spending; and addressing

the economic, social and environmental "debts" incurred during the previous decades. Given the magnitude, novelty and complexity of these challenges, it appears that this process of adjustment will continue to be slow and fitful.

Many health professionals in Brazil believe that the major problem facing the health sector is that "too little is spent on health." Brazil's overall and public spending on health (about 5% and 2.5% of GDP, respectively) are typical for an economy with Brazil's level of GDP per capita. Because the overall level of current spending on health is similar to that of other countries with similar per capita incomes, and because Brazil faces a prolonged period of fiscal austerity, it is unlikely that government will spend much more on health services in the medium-term.

The principal problem in the health sector in Brazil is not, however, too little money, but rather the inequitable, ineffective and inefficient application of the adequate resources which are available. It is inequitable because too much public money is spent on the well-off. It is ineffective because too much is spent on "private goods" (such as curative care, which provide direct benefits to the users of such services) and too little is spent on "public goods" (such as information on healthy behavior and environmental protection, that provide benefits to society as a whole). There is a close connection between too much public spending on the well-off and too much public spending on private goods. For this reason, making public spending more equitable would also make it more effective⁽¹⁷⁾. Finally, public spending is inefficient in that, at virtually all levels, the management and human resource systems are antiquated and unproductive.

Is an intensive preventive package affordable? Although precise information on costs in Brazil are not available, it is estimated that an initial "core" preventive program (which might include campaigns to prevent smoking, alcohol and drug abuse, traffic accidents and AIDS, and to promote exercise, and a national cervical cancer screening program) would require only about 3% of total public resources spent on health.

As with prevention, there are no easy or short-term solutions for health service financing, and no "models" to follow that will assure success. No industrialized country has yet found a solution to the problem of financing the health needs of populations that, like Brazil's, are aging, have a high

prevalence of chronic and degenerative diseases, and feel entitled to the benefits of sophisticated and expensive medical care.

From the partially successful efforts of other countries, and from Brazil's own modest successes in recent years, it is apparent that a creative response to financing health services in the next decades might include:

- **Decentralization and a transparent transfer system:** Because the health system will continue to be subjected to exogenous forces beyond its control, the system will need to become flexible so that innovative and rapid adjustments can be made to changing external circumstances. An important component of such flexibility will be the decentralization of much decision-making authority, as envisaged in the Constitution. For decentralization to work, it is essential that the federal-state and state-municipal transfers of health funds become more automatic and transparent. It is anticipated that the rules governing such transfers will be included in the complementary law currently being discussed in the Congress.

- **Resource allocation, with priority for the poor:** The impact of public spending on health will be increased if more is spent on cost-effective health promotion and disease prevention activities, and if more is spent on providing preventive and curative services to the poor. It is the poor who are most exposed to, and suffer most from the new health risks, and the poor who are under-served.

- **Mobilizing private resources:** Given that public resources for health are likely to remain limited, and that prevention and care of the poor should be given priority, it will be necessary to mobilize the private resources of the middle-class and the rich to supplement the public resources available for their care. It is likely that modern, efficient private health maintenance organizations will have an important role to play in this process.

- **Rationing:** Costs of medical procedures can be so high that insurance is a universal feature of health care systems (public and private) in developed countries to protect individuals from so-called catastrophic costs. But once costs to individuals of expensive procedures are minimized, the individual demand for such procedures escalates and the bill for meeting the sum of individual demands exceeds the collective willingness to pay. Rationing of

medical care is therefore inevitable, even in privately financed systems. Demands on the health care system in Brazil will increase as a result of demographic and epidemiologic changes, as access to publicly financed health services becomes universal and as high-technology treatment techniques become available. It is desirable that the criteria for rationing be specified explicitly, for implicit rationing will surely mean giving low priority to the needy.

- **Using incentives and modern management techniques:** Only in the last few years has any attention been paid to the efficiency with which public resources are used for health in Brazil. A review of experience in industrialized countries, Latin America and Brazil suggests that Brazil has focussed too heavily on normative controls and experimented too little with improving efficiency through incentives for providers and users. The required modernization of the management of publicly financed health care in Brazil would include: the definition of more creative and productive ways of working with the private sector; the development of capacity to assess and manage high-cost technology; and the development of modern human resource and information management systems. Some useful work in this direction was started by INAMPS in the mid-1980s and some of the states have recently made significant preliminary steps towards modernizing the management of the public health delivery system.

Part I:

THE HEALTH SECTOR IN CONTEXT: New Economic, Political, Demographic and Epidemiological Realities

This part of the study discusses some of the challenges confronting the Brazilian health sector as a result of profound economic and political changes in recent decades. The discussion is based on two premises. The first is that the structure of the health sector, and the philosophy that guides its development, can be understood only in the context of broader political and economic developments within the society. The second premise is that, because of the rapidity and depth of recent changes, an historical perspective is essential in defining current challenges and the appropriate responses.

THE ECONOMIC "MIRACLE"^(68,103,146)

Brazil's recent economic history is divided into two distinct phases: the "miracle years" of the 1960s and 1970s and the economic stagnation of the 1980s. During the 1960s and 1970s, Brazil was one of the fastest-growing economies in the world, with GDP increasing five-fold during the period. Between 1965 and 1980, industrial production rose at an average of 10% per annum. Simultaneously, agriculture's share of GDP declined from 19% to 11%⁽¹⁰⁴⁾. Coffee accounted for 44% of Brazil's exports in 1965; two decades later, industrial goods accounted for 67% of exports.

The benefits of this industrial growth were spread very unevenly, both by region and by income class. The South and Southeast Regions accounted for about 75% of the new non-agricultural jobs⁽¹⁰³⁾. And the richest 10% of the population captured about 50% of GDP throughout the period⁽¹⁴⁶⁾.

The economic boom had profound implications for who worked and where people worked. Between 1965 and 1980, the share of the labor force in

agriculture fell from 49% to 31%⁽¹⁰⁴⁾. Between 1960 and 1985, the proportion of adult women who were economically active increased from 17% to 37%⁽⁶⁸⁾.

There was also an important political dimension to these changes. The "miracle" was directed by a centralized military government. Resources and power were heavily concentrated in the executive branch of the Federal Government. While formal party politics were stifled during the years of military rule, the process of industrialization and formalization of the work force was accompanied by the development of new forms of workers' organizations. Independent trade unions arose, making obsolete the government-sponsored trade unions that had been set up in the 1930s. The two largest trade unions, with tens of millions of members between them, became independent and powerful political and social forces, especially in Sao Paulo.

The health consequences^(101,164)

The economic changes during the miracle years induced equally profound demographic and epidemiological changes. The South and Southeast experienced massive rural-to-urban migration; between 1960 and 1980 the rural population in the Southeast shrank by 33%. Outmigration from the Northeast was also large, with the proportion of the national population in this region declining from 32% in 1960 to 29% in 1980.

When people moved, they faced a different set of social and economic circumstances and they modified their behavior accordingly. In 1960, for example, the average woman expected to have about 6 children in her lifetime; by 1980 this figure had fallen to 4.5 (and by 1985 to 3.5).

The industrialization and urbanization processes also changed the health risks that workers and their families faced. In the 1960s, the typical worker lived in a rural area, worked in agriculture and had little disposable income. The health of his family was poor because he could not afford to purchase needed food and because they suffered from endemic infectious and parasitic diseases. His children died of diarrhea and respiratory infections. He and other adults suffered from Chagas' disease, malaria, schistosomiasis and leishmaniasis.

The miracle changed the face of this Brazil. Despite the government's growth-before-social-improvement philosophy, deaths associated with underdevelopment fell sharply. Between 1960 and 1980, infant mortality rates dropped by about 40%, and death rates due to infectious and parasitic diseases declined by about 70%⁽¹⁰¹⁾. These improvements notwithstanding, the old problems remained very serious in Brazil. For example, in 1980, the infant mortality rate (of 77 per 1,000) is much higher than that of other middle-income countries in Latin America⁽¹⁰²⁾.

When a rural family migrated to Sao Paulo, its situation changed totally. There were many social and economic rewards, but there were also new threats. Husband and wife both entered the work force, operating dangerous machines in factories where they were also exposed to hazardous chemicals. They had to take transport to work, and they and their families had to learn to coexist with automobiles and other vehicles. They breathed polluted air. Although their income increased, so, too, did health-threatening ways of spending this income. Television advertisements encouraged them to smoke cigarettes and drink alcohol. The woman could purchase birth control pills at the local pharmacy. They lived in favelas, where crime rates were high.

The health effects of some of these new threats were immediately apparent: Pedestrians died in large numbers in traffic accidents⁽⁷²⁾; murder rates rose rapidly⁽¹⁴²⁾; and the numbers injured in industrial accidents increased sharply⁽¹⁰⁷⁾. Cardiovascular disease rates, and more particularly stroke rates, in the cities of the Southeast were among the highest in the world in the 1980s⁽⁸³⁾. The full impact of some of the other risks would take longer to show up in health statistics: Cigarette consumption rose rapidly in the 1970s⁽²⁾, but its

effect on lung cancer rates is still not fully apparent⁽¹¹⁹⁾.

For the better-off, the changes were less abrupt, and the new threats somewhat less acute. Although they also lived in urban areas, they generally lived in less polluted areas with lower crime rates and better traffic control and they worked in less hazardous occupations⁽¹²⁷⁾. However, they, too, adopted behaviors that put them at risk of cardiovascular diseases and cancer: They exercised little, smoked a lot and seldom controlled their diets.

During this period, there were gradual improvements in the abysmally low levels of education. By 1973 26% of eligible children were enrolled in secondary schools. Although this represented a substantial improvement on the 16% enrolled in 1965, this still left Brazilian levels of secondary school attendance at about one half of the median for upper middle income countries⁽¹⁰⁸⁾.

The provision of health services^(21,34,38,61,162)

In 1967 pre-existing social insurance funds were consolidated into the National Institute of Social Welfare (INPS). Participation was mandatory for all formal sector workers. The system was designed as a "pay-as-you-go" system, in which contributions were to be used to pay for three major types of benefits: retirement, disability and health services.

During the late 1960s and 1970s, as the economy grew rapidly and as formal sector employment rose, the social security budget expanded -- at an average annual rate of 13% in the 1970s⁽²¹⁾. It soon accounted for about 6% of GDP, and about 30% of the total federal government budget⁽²¹⁾.

Between one quarter and one third of the social security budget was used to finance health services for contributors and their families⁽³⁴⁾. The bulk of these resources were used to purchase hospital and ambulatory care services from private contractors. From 1977 onwards, the health component of the social security system was administered by the National Institute for Medical Assistance and Social Security (INAMPS).

With the rise of social security-funded health care, federal planners considered "health" to be largely taken care of. The Ministry of Health received only a little over 1% of the total federal budget, and its

proportional share of GDP declined⁽²¹⁾. This meant that expenditures on prevention and basic services for the poor grew slowly, while there was explosive growth in personal curative services for those employed in the formal sector.

Because it accounted for about three quarters of all federal health spending, the social security administration became a powerful force in the health sector. Its vision, however, was consistent with its mandate, which was to provide personal services to formal sector workers. The management imperative was to pay bills, not to set health policy.

Slowly but surely, therefore, this meant that "health" became virtually synonymous with the provision of personal curative services. As spending on "private goods" (see Box) grew, so the proportion of public health resources spent on "public goods" (such as control of endemic diseases) fell. The proportion of total health spending devoted to prevention and basic health services declined from 64% in 1965 to 15% in 1980⁽²²⁾.

The health profile of formal sector workers was the health profile of the new Brazil, with cardiovascular diseases, stroke, cancers and injuries accounting for the majority of hospital costs borne by INAMPS.

INAMPS' modus operandi was a direct reflection of the political climate of the miracle years. INAMPS was (and is) a federal institution, with power centralized in a President and his bureaucracy. INAMPS did not consult with the state and municipal governments, and gave them no say in what it did within their jurisdictions. INAMPS was a "given" that state and local health authorities had to accommodate.

INAMPS delivered services to contributors through two principal mechanisms: INAMPS' own facilities and privately contracted suppliers of hospital and ambulatory care services. With the additional assistance of large subsidies for the construction of hospitals, private contractors, the so-called "contracted network," came to play a dominant role in all aspects – hospitalizations, complementary tests, and outpatient services – of the health care system.

In the face of growing opportunities for physicians in the "private sector" (somewhat of a misnomer, given the dependency of this sector on public

financing), the public sector chose to allow physicians to hold both public and private jobs. This introduced an obvious conflict of interest, since physicians could, and did, use their public service to recruit patients for their private practices. In another important way INAMPS reflected the Brazil of the miracle years: With annual budget increases of 13%⁽²³⁾, its central bureaucratic concern was to spend money and to account for expenditures, not to worry about efficiency. INAMPS' own facilities were given generous budgets and the contracted network was paid on a fee-for-service basis. This gave rise to two institutional cultures that today constitute major impediments to reform: The public sector had no incentive to try to do more with less, while private contractors had every incentive to boost income by providing unnecessary services or even billing for services not performed.

Just as there was internal opposition to the overall development model, so too there were critics who strenuously opposed the heavy reliance on hospitals, the privatization of medical services, and the absence of criteria and controls, and who correctly predicted the distortions which would arise from such a model^(25,26).

THE DECADE OF ECONOMIC STAGNATION

At the end of the 1970s, Brazil's economic situation changed dramatically. The oil shock was a major factor, as were expansionary domestic fiscal policies and the persistence of high real interest rates. The economy of the 1980s came to be dominated by rising inflation, high public fiscal deficits and the need to service a large external debt. The river of growth of the 1960s and 1970s slowed to a trickle, with GNP per capita increasing by only 1% a year⁽²⁷⁾.

There were also deep political changes in the 1980s that affected the health sector. The government passed out of direct military control, and political participation broadened. State governments became more assertive, as did the Congress, with broad segments of civil society, including business, professional and workers' organizations, demanding a voice in policy formation.

The Private and Public Benefits of Health Care⁽¹⁶⁰⁾

Goods and services provided by the health system can usefully be classified with respect to who receives the benefits of them. At one extreme are purely private goods, for which all benefits of use are captured by the person who consumes the health service, and at the other extreme are purely public goods, for which all benefits are equally received by all members of society. A heart by-pass operation is a good example of a purely private health good. Improving air quality or providing information on healthy behavior closely approximates a purely public health good. Many actual health services are of a mixed type; the consumer captures some purely private benefits, yet others also benefit from that person's consumption of the service. For example, the person who is vaccinated against measles receives a private benefit of protection, but others benefit as well because they are less likely to be exposed to the illness.

Consumers are almost always willing to pay directly for health services with largely private benefits. But they are generally reluctant to pay directly for programs and services which benefit society or communities as a whole. Consumers tend to wait and hope that others will provide the funds needed for the adequate provision of the public type of service – the so-called free rider problem. That is why in most societies the health services with largely public benefits are funded by general revenues rather than user charges. Only public involvement will provide sufficient public goods (and mixed goods with a significant public benefit).

Health services with mostly private benefits, for which there is therefore great willingness to pay, are often equated with curative care while those with mostly public benefits, for which there is little willingness to pay, are equated with preventive care. But the correspondence is not exact. For some preventive care, such as screening for hypertension or cervical cancer, most benefits are captured by the recipients of the service and their families. For some curative care, such as the treatment of a sexually-transmitted disease, there are public or social benefits to others as well as private benefits to the patient.

The health consequences

In broad terms, the health profile in the 1980s was continuous with that which had emerged in the 1970s: Urbanization, rapid fertility declines and (with some temporary exceptions) infant mortality declines continued. In terms of the new diseases, as shown in Chapter II-4, the picture was mixed. Society was learning to live with some of the new risks: Deaths from traffic accidents declined significantly, as did death rates due to industrial accidents. In the industrial cities of the South and Southeast, the high cardiovascular disease rates continued the slow decline that began in the 1970s. There were improvements in acute coronary care and in some important risk factors: Per capita cigarette consumption declined significantly, and notable improvements were made in air quality in

some very polluted cities. On the other hand, there was an explosive rise in homicides, and rates of lung cancer and breast cancer rose. And in 1982, the first AIDS cases were reported in Brazil.

The provision of health services

The consequences of the recession for INAMPS were serious⁽⁶¹⁾. Contributions to the social security system dropped as wages fell and formal sector employment declined, and the allocation to INAMPS fell as greater demands were made for retirement benefits.

In 1980 30% of social security funds were spent by INAMPS; in 1982 and 1983 the proportion was below 23%⁽³⁶⁾. Although INAMPS' allocation has increased appreciably in the past few years, there

has been little real growth in INAMPS' budget over the course of the decade⁽³⁶⁾.

There is little doubt that INAMPS would have had to undergo major changes even if declining allocations had been the only threat to the *modus operandi* developed in the 1970s. Concurrently, however, the system was confronted by two other threats. First, in a democratic Brazil, it was no longer acceptable to have publicly financed health services for half of the population, and virtually nothing for the other half. And second, it was no longer acceptable to have all policy dictated at the federal level. State and local officials demanded more responsibility and control. For the critics of the health services system mounted during the years of military rule, this was the moment in which to begin forging a new system.

In the mid-1980s, a forceful and articulate advocate of these changes assumed the Presidency of INAMPS and set about the difficult task of reforming the agency. The challenge was not only to prepare INAMPS for a new role in a unified and decentralized system, but also to introduce controls that had been neglected in the boom years. All of these reforms were essential, and each represented a threat to either or both the INAMPS bureaucrats and the private network that had flourished under the old system.

Between 1985 and 1988, resistance from these factions notwithstanding, major changes were made in INAMPS. A series of measures, including an end to the fee-for-service payment system and implementation of more thorough audits, were undertaken to reduce the excesses of the contracted network. And, through the SUDS (Unified and Decentralized Health Systems) decree of 1987, publicly financed health services were formally integrated at the state level, and all Brazilians granted access to these services.

However, in the health sector, as in the society at large, "the old is dying and the new cannot be born; in this interregnum there arises a great diversity of morbid symptoms³⁷." In the last few years these modernizing reforms have stalled and, in certain instances even rolled back. The decisive ideological battle was over the content of the health chapter in the new Constitution, which unequivocally establishes a unified and decentralized system. It appears to be just a matter

of time before the reforms become law and are implemented.

An important development in the 1980s has been the growth of a the modern, autonomous private health sector in Brazil^(38,152). This sector includes a variety of health maintenance organizations (HMOs), preferred provider organizations (PPOs), and health insurance schemes. In substantial part, this sector has arisen because of the decline in the quality of publicly financed services during this period. Because the modern industrial sector must have a work force with low rates of illness and absenteeism, workers in most of these industries are enrolled in an HMO or PPO. The payments are shared by the employer and the workers (who continue to pay their "contributions" to the social security system, but who use that system only for those items not covered in the plan). It is estimated that these plans provide services to about 20 million people, primarily in the industrialized Southeast.

This sector is quite distinct from the so-called "private sector" of the INAMPS-contracted network. The culture of the contracted network is parasitic, since it depends on INAMPS for its existence, is riddled with conflicts of interest, and has a vested interest in preventing the modernization of the public sector. The HMOs and PPOs, by contrast, get no public funds but compete strenuously on the basis of cost and quality for a share of the market in the industrial centers. Although it has some serious problems (discussed in more detail in Part III), it appears that this sector could be a major stimulus to, and possibly even a partner with, the public health sector in the difficult years ahead.

TOWARDS THE 1990s

The Brazil of 1989 is scarcely recognizable as the product of the "miracle" decades. Brazilians correctly describe the crisis as more than simply an economic crisis or even an economic-cum-political crisis: It is a "moral crisis", in which the very foundations of social organization are uncertain.

There is little doubt that the halcyon years of the "miracle" are gone forever and that the country will face protracted economic and political difficulties in the years to come. On the economic front, macroeconomic imbalances and deficits in the social security system are not sustainable and will necessitate cuts in public spending, which will

inevitably continue to affect health as well as other sectors. This is likely to be a fitful process, as fiscal realities clash with the dreams of expenditure nurtured by the process of democratization and the Constitution of 1988.

The framework for a democratic Brazil has been laid down in the new Constitution of 1988, which mandates that the legislature share responsibility with the executive branch in formulating national policy. The Constitution also gives state and local governments substantially increased responsibility and resources, and explicitly recognizes the importance of non-governmental social organizations, such as unions and community organizations.

On the political front, the price for the years of atrophy during military rule will have to be paid. Anachronistic political parties and behavior are still the norm in Brazil; parties that respond to the realities of the new Brazil are still incipient.

The prognosis for health

The demographic and epidemiologic trends described earlier will continue through the coming decades. In 30 years, more than 85% of Brazilians will live in urban areas; the number of elderly will have doubled and 12% of the population will be 65 years or older; and cardiovascular diseases, cancers and injuries will account for about 74% of deaths.

Prevention of the new causes of death is a complex task, for which there is no blueprint. It is clear that changes are often slow, and the consequences of such changes are often apparent only after long delays. And yet there is also clear evidence from Brazil and elsewhere that changes are possible, and that these can both improve health and, in the long run, reduce the costs of illness to society. Accordingly, the major task for the Brazilian public health system in the coming decades will be to develop effective institutions and programs for health promotion and disease prevention. Part II of this report outlines priorities for such actions and the major philosophical, institutional and financial changes that will need to occur in the health sector.

The prognosis for health services

The Constitution of 1988⁽²⁾ lays the ground rules that will govern the development of the public health sector in the coming decades. It mandates a unified public health system to which all will have access and control of which is to be largely decentralized to the state and local levels. The detailed structure of this system, and the arrangements for financing it, will be partially clarified with the passage of the complementary legislation on health (to be considered by Congress in late 1989). But the fundamental imbalance between entitlements and resources will only be resolved in the budgetary process over the years. The current prognosis is poor.

It is certain that much greater demands will be placed on the health system as the population ages, as the expensive chronic and degenerative diseases become still more prominent, and as all Brazilians gain access to the public system. It is equally certain that public financial resources will be incapable of meeting these rising needs, let alone of financing vital health prevention and promotion activities. It is argued in Part III that the most likely, although preventable, scenario is that the vast majority of public resources will be spent on ineffective, high-cost curative medicine for the privileged classes. While there is no panacea, the system could do much better if it modifies some currently hegemonic proposals, and is willing to be innovative and flexible.

A CAVEAT ON DATA

Parts II and III of this report present detailed epidemiological and financial data on the health sector in Brazil. As would be the case in a broad analysis in any country, the precise data required are not always available. In the case of Brazil, it is appropriate to point out some of the particularities of, and limitations to, the available data.

First, there are limitations in the type of epidemiological data available. As will become apparent in Part II, by far the most complete and comprehensive data are on mortality⁽³⁾. Data on

the prevalence and incidence of infection, illness and disability are far less satisfactory. The hazard of drawing conclusions from mortality data alone is illustrated by considering the relative importance of burns and motor vehicle accidents in Sao Paulo. If mortality data alone are used, burns appear to be relatively unimportant (equivalent to only about 10% of the number of deaths from traffic accidents). If, however, the concern is with disability, and its social and financial costs, then a different picture emerges. A survey of the institutionalized disabled in Sao Paulo shows that the numbers institutionalized for burns is about equal to the number institutionalized as a result of traffic accidents.

A second cause of concern is the wide variability in the quality and quantity of data by region as Figure 1-1 shows⁽²⁰⁾. With some minor exceptions, reliable mortality data are still available only in the South and Southeast. It is these areas, too, that have the longest and most detailed data series, and the most numerous and sophisticated analyses. Sao Paulo is pre-eminent, but Rio Grande do Sul has also been fertile ground for epidemiological enquiry. While there are some heartening exceptions – such as excellent work on the epidemiology of cancer in Fortaleza, and on cardiovascular disease and mental health in Salvador – this study will necessarily draw very heavily on studies from Sao Paulo and Porto Alegre. For a study that focuses on chronic and degenerative diseases and diseases of adults, it could be argued that these industrial centers are “the leading edge”, and that it is precisely their experiences that are most insightful in trying to foresee national developments in the decades ahead.

A third cause of concern is the paucity, type and reliability of data on health care financing. Most of the financial data used in this study come from DATAPREV, the accounting system used by INAMPS to pay the contracted network. The DATAPREV data have many limitations. First, DATAPREV was designed as an accounting system, not as a tool for health planning and evaluation. For example, the DATAPREV system does not contain any information on who uses the INAMPS-financed services, and does not even collect information on the diseases treated through outpatient facilities. Second, the contracted network represents only one part of the complex of health providers in Brazil. Extrapolations from the DATAPREV data would be misleading in many cases. For example, with INAMPS' elimination of

the fee-for-service payment system, the contracted network by and large no longer cares for many INAMPS patients with complicated and expensive conditions, referring them instead to public hospitals. An assessment of the relative costs of a simple and cheap category of diseases (such as intestinal infections) and a complex and expensive category (such as cancers) using DATAPREV data only would be totally misleading. A final and by no means trivial limitation is the difficulty in getting even simple tabulations out of the antiquated DATAPREV information system.

Part II: PREVENTION: What are the problems and what can be done?

SUMMARY

A review of risk factors and trends in major causes of adult death between 1980 and 2020 shows that it is likely that:

- the proportion of all deaths due to cardiovascular diseases, cancers and injuries will rise from 54% to 74%;
- death rates due to cancers will increase substantially due to recent heavy exposure to cigarette smoke and environmental pollution;
- death rates due to injuries will continue to increase, with rising homicide rates a critical factor;
- death rates due to cardiovascular diseases will decline slowly; and
- the gap between the health of the poor and the rest of society will widen.

The joint effect of demographic and epidemiologic trends will be a large increase in the cost of medical treatment. By 2020, this effect alone (without allowing for an increase in the proportion of the population served or the quantity and quality of care) will double the per capita costs of providing medical treatment. This gloomy assessment, moreover, is based on the implicit assumption that AIDS will disappear! Every indication, however, is that the AIDS epidemic in Brazil will be larger than in the industrialized countries.

Although these are problems for society at large, the risks for virtually all these great public health threats are concentrated amongst the poor. This makes the already difficult problem of prevention even more difficult. And it implies the evolution of a dualistic society from a public health point of view.

In such an environment, prevention is a daunting task. The primary prevention task is a fundamental one: constructing a more equitable and just society. In the health sector, large-scale programs for health promotion and disease prevention need to be initiated, with efforts concentrated on cost-effective preventive activities. There is an important role for community and workers' organizations in pushing for better traffic and worker safety and better environmental conditions, and for government in providing supportive legislation and resources. The health system has a role in working with others to motivate people, particularly the poor, to smoke less, eat better, exercise more, and practice safer sex. There is evidence from other countries that modernization of the criminal justice system (which includes a major role for prevention and for community involvement) can have a significant impact on homicide and other crimes. Finally, the medical care system has a role in improving the coverage and effectiveness of screening programs and in providing better quality treatment for the sick, both rich and poor.

Should a successful prevention package be implemented, it is conceivable that in the year 2020, overall sickness and death rates would be 15% lower than would otherwise be the case, and that per capita medical care costs would increase 75% over costs in 1980, rather than the 100% increase that is anticipated in the absence of effective prevention.

CHAPTER II-1:

THE IMPORTANCE OF POST-TRANSITION HEALTH PROBLEMS

Table II-1: The relative importance of different diseases (% to total)

	Mortality	Estimated Publicly Financed Costs of Hospitalization for Illness	Years of Potentially Productive Life Lost Between Years 1 and 65	Premature Retirements
<i>Source:</i>	(96)	(36)	(14)	(138)
Cardiovascular	33	29	13	28
Respiratory	10	11	7	--
Mental	0	21	0	14
Injuries	12	5	19	--
Cancers	11	20	10	--
Infectious & parasitic	10	4	4	5

Non-communicable diseases of adults and injuries already dominate the health picture in Brazil. As shown in Table II-1, circulatory diseases, cancers, mental illnesses and injuries account for about: 55% of all deaths; 42% of years of potentially productive life lost between the ages of 1 and 65 years; 42% of premature retirements; and 75% of the publicly financed cost of hospitalization for illness.

By contrast, infectious and parasitic diseases account for only: 10% of all deaths; 4% of years of potentially productive life lost between the ages of 1 and 64 years; 5% of premature retirements; and 4% of the publicly financed cost of illness-related hospitalizations.

As the epidemiological transition proceeds in Brazil, the relative importance of infectious and parasitic diseases will continue to decline, as will the relative importance of childhood death and disease. Between the years 1980 and 2020: the proportion of

all deaths attributable to cardiovascular diseases, cancers and injuries will rise from 54% to about 74%; and the proportion of all deaths in persons under 15 years of age will decline from 25% to about 9% (Figure II-1).

This part of the study discusses:

- 9 a cost-benefit framework for assessing which interventions should be given priority (Chapter II-2);
- 9 the major risk factors for the post-transition causes of death (Chapter II-3);
- 9 levels and trends in the major post-transition causes of death (Chapter II-4);
- 9 the likely structure of mortality in the next 30 years (Chapter II-5);
- 9 the special problem of the poor (Chapter II-6);
- 9 preventive activities which have been carried out in Brazil and elsewhere, the costs and impacts of these activities, and the implications for setting priorities for prevention in Brazil (Chapter II-7).

CHAPTER II-2:

A FRAMEWORK FOR SETTING PRIORITIES

By definition all preventive and curative interventions result in improvements in health and are, therefore, "desirable". However, all interventions also cost money. Since private and public resources are limited, choices have to be made. There are two principles which should be considered in making such choices. First, priority should be given to those interventions which produce the greatest "impact" per dollar spent. And, second, private goods (for which all benefits of use are captured by the person who uses the service) should usually be privately financed, with public financing used only for public goods.

PRINCIPLE 1: GIVE PRIORITY TO COST-EFFECTIVE INTERVENTIONS

Assessing Impact:

The impacts of health programs can be measured in several ways. In the past there have been limited efforts at estimating economic benefits, but most analyses have estimated the demographic impacts (such as increases in life expectancy, years of life saved, and deaths averted). A problem with these demographic measures is that they implicitly assume that the sole objective of a health intervention is to reduce mortality. An important recent development is the concept of a "quality-adjusted-life-year" or QALY. By assigning utility values on a scale from 0 (dead) to 1 (healthy), and then combining these utility weights with data on life years gained, analysts have been able to calculate the QALYs resulting from various health care interventions⁽⁴⁷⁾. Different interventions are then compared on the basis of cost/QALY.

There are formidable analytic difficulties in assessing the impacts of health interventions. First, even in the most sophisticated developed countries such an exercise is problematic because:

- little is known about how different preventive programs influence personal health practices;
- there are large uncertainties regarding the direct and indirect impacts of most health interventions;

- many interventions (such as improvement in air quality) produce benefits other than just health benefits;
- there are large uncertainties regarding the economic valuation of health benefits, and
- many interventions (such as exercise) affect a number of health outcomes.

In part because of these difficulties, the empirical literature on the costs and impacts of interventions for improving the health of adults is primarily a literature of the costs and effectiveness of curative medical interventions*. There is a smaller (but still significant) literature on the effectiveness of secondary preventive actions (such as screening programs). However, there are few analyses of the costs and effects of primary preventive programs. For lack of data, a definitive recent assessment of the costs and impacts of preventive programs in the United States⁽¹²⁸⁾ was unable to assess the cost-effectiveness of preventive programs designed to change "life-style" (smoking, diet, and exercise, for example) and only able to outline what sort of information would be needed.

A second difficulty in assessing impacts arises because the effect of most preventive interventions depends on a host of country-specific factors (including the capacity of the implementing agencies and the behavioral response of those potentially affected by the intervention). There are therefore large uncertainties in extrapolating from the experience of one country to another and, more specifically, from the experience of industrialized countries to the quite different circumstances in Brazil.

* There is a more substantial literature on the cost-effectiveness of interventions for improving child survival⁽¹²⁸⁾.

Assessing costs:

There are formidable conceptual and empirical difficulties with assessing costs, too. Consider, for example, an assessment of the costs of an exercise program. A recent analysis has shown that an exercise program is probably cost-effective if the opportunity cost of time spent exercising is relatively low, and not cost-effective if the opportunity cost of time is high⁽⁶⁴⁾. How should such time be valued, and how should this change if the exercise is "enjoyable"?

In addition, even in developed countries there are empirical difficulties with estimating costs. It is generally necessary to piece together cost information from unrelated sources of information.

In developing countries the task of estimating costs is considerably more difficult. In Brazil, due to the pervasive distortions in the ways in which health services are financed, the relationship between nominal "costs" and the opportunity costs of resources used is often tenuous. In practice cost estimates generally have to be derived from limited and unsatisfactory national data, or based on the experience of developed countries (in which the organization and internal efficiency of the services are usually quite distinct).

Cost-benefit and cost-effectiveness analyses in industrialized countries:

In principle, cost-effectiveness analyses should affect the ways in which resources are allocated:

- within specific health programs (e.g. how often should women have pap smears?);
 - Between different types of health programs (e.g. how much should be spent on coronary bypass operations relative to hemodialysis or a smoking campaign?); and
- cost-benefit analyses should affect the allocation of resources between the health sector and other sectors of the economy.

In practice, there are only two levels at which the uncertainty associated with the cost-effectiveness measures is sufficiently small that actual policies have been affected in a major way by such calculations. First, by far the major application of such analyses has been to assessing the relative efficacy of specific medical procedures (which are primarily curative, but sometimes preventive, too⁽⁶⁵⁾).

Second, cost-effectiveness analyses have also instigated changes in specific preventive programs. For example, the frequency with which women are advised to have pap smears has been increased from 1 year to 5 years on the basis of a cost-effectiveness analysis⁽¹⁷¹⁾.

An analytic procedure in Brazil:

Given the universal limitations of cost-benefit and cost-effective analyses, and the limited amount of data available on both costs and impacts in Brazil, a rigorous, quantitative procedure for setting priorities is not possible. Nevertheless, the principle – that planners should take both likely costs and effects into account – remains important. Accordingly, in Chapters II3 and II7 of this paper attention is paid to the likely costs and effects of different health interventions in Brazil, the tentative implications for policy, and the steps which need to be taken to improve the quality of data available for assessing both costs and impacts. Finally, it is relevant to note that over the past few years there have been major conceptual advances in cost-effectiveness techniques in industrialized countries⁽⁴⁷⁾, and there is currently much interest in assessing the cost-effectiveness of health promotion and prevention activities. It is likely that in five years time a great deal more will be known in industrialized countries and, if the relevant data can be collected, in Brazil, too.

PRINCIPLE 2: USE PUBLIC RESOURCES TO FINANCE PUBLIC GOODS

As described in Box I-1, standard economic theory advocates the use of public resources for public goods (which are subject to externalities or excludability). Although some preventive health activities (such as air pollution control and the provision of health information) are classic public goods, the distinction between public and private goods is not synonymous with the distinction between preventive and curative care⁽²¹⁾. Curative care – such as treatment of sexually-transmitted diseases – can sometimes be in part a public good. Conversely, the benefits of much preventive care that is administered to individuals (such as screening for hypertension and cervical cancer) are largely captured by those who receive such care, and are thus primarily private goods. Under many health financing systems it might be appropriate to use public funding to cover the costs of providing

individuals with information on the problem and options for treatment, but have individuals themselves cover the actual costs of the treatment.

How should this conceptual construct affect the financing of preventive services in Brazil? As discussed further in Chapter III-3, given the current structure of health financing in Brazil, and given the level of underinvestment in preventive services, as a first step, public financing for virtually all cost-effective preventive interventions is justified, at least in the short term.

CHAPTER II-3: MAJOR RISK FACTORS FOR ADULT ILL-HEALTH: LEVELS AND TRENDS

Why do some adults suffer from these non-communicable diseases while others do not? By far the most important underlying risk factor for adult ill-health in Brazil is the inequitable economic and social system. Poverty and low levels of education emerge repeatedly as the most powerful variables explaining why disease and death rates are particularly high for certain groups and individuals in Brazil. This chapter documents the specific ways in which this underlying factor is translated into proximate group and individual health risks. Specifically, the levels and determinants of, and trends in, personal behaviors (smoking, diet, lack of exercise, use of drugs and alcohol and sexual behavior) and in group risks (environmental contamination and occupational hazards) are examined.

HAZARDOUS PERSONAL BEHAVIORS

Smoking*

Tobacco smoking is a major cause of disease and death among adults throughout the world⁽⁶⁰⁾. Smoking has a direct causal role for cancer, cardiovascular disease and chronic obstructive lung disease and an indirect role in diabetes and injury. It is estimated that cigarette smoking is directly responsible for about one quarter of all adult deaths worldwide.

Tobacco is an important crop in the Brazilian economy. Brazil is the world's fifth largest tobacco producer and the second largest exporter of tobacco leaf and tobacco manufactured products⁽²⁾. Tobacco is particularly important to the economy of the Southern Region: It accounts for about one-quarter of all exports from Rio Grande do Sul, Santa Catarina and Parana (which produce three quarters of Brazil's tobacco products). For many farmers

* Background papers on smoking were prepared by Achutti⁽²⁾ and Costa e Silva⁽³⁰⁾

there are no comparably profitable substitute crops⁽⁶⁰⁾. Tobacco is also an important source of revenue to government. The tax on cigarettes in Brazil is among the highest in the world (75% of sales price is tax), and represents about 12% of all tax revenues⁽¹⁰⁰⁾.

Currently about 63% of adult Brazilian men and about 33% of adult Brazilian women smoke cigarettes. The average male smoker smokes about 20 cigarettes a day, while the average female smoker smokes about 10 cigarettes a day⁽²⁾.

As shown in Figure II-2, per capita cigarette consumption increased rapidly for decades until the late 1970s. Since then per capita consumption has declined by about 20%.

Detailed national-level data on smoking habits in Brazil are not available. A series of prevalence surveys in South and Southeast Brazil (Figure II-3), however, indicate that⁽²⁾:

- smoking prevalence was substantially higher for men than women in the 1970s;
- the prevalence for both sexes increased among all age groups during the 1970s;
- the prevalence for women continued to increase for all age groups in the 1980s, while rates for men declined.

The relationship between cigarette smoking and income is complex. Comparisons of both countries and individuals^(57,100) show that higher income is associated with:

- greater expenditure on cigarettes;
- a higher per capita level of cigarette consumption; but
- a lower prevalence of cigarette smoking.

That is, higher income generally means a reduction in the number of people smoking, but an increase in the number of cigarettes smoked and expenditure on cigarettes.

In Brazil, a survey of household expenditures in Brazil in the mid-1970s⁽⁶⁶⁾ showed that, for the poor and middle class, a 10% change in total income was associated with about a 10% change in expenditures on cigarettes. For higher income groups the demand for cigarettes was considerably less elastic. These results are broadly consistent with findings in industrialized countries.

With regard to prevalence, in Brazil as in other countries, better-educated (and higher income) individuals have responded most to anti-smoking campaigns. Recent studies in Brazil have shown that the poor and less educated are more likely to be cigarette smokers⁽¹²⁶⁾.

The quantity of cigarettes smoked is also elastic with respect to price⁽⁵⁷⁾. In industrialized countries, in the long run the consumption of cigarettes has dropped by about 5% for each 10% increase in the price of cigarettes, with demand among young males being particularly sensitive to price changes. No data on the price elasticity of demand for cigarettes are available in Brazil, but it is widely believed that demand for cigarettes is highly price elastic, especially for younger people (whose smoking habit is apparently less well-formed). This assumption is incorporated into the National Anti-Smoking Campaign (which recommends still higher taxation of cigarettes as a means for reducing consumption)⁽³⁸⁾.

As in other countries, cigarette consumption in Brazil is probably also responsive to anti-smoking information and propaganda⁽¹²⁶⁾. Anti-smoking campaigns in Brazil started in Rio Grande do Sul in 1976. The national anti-smoking campaign mounted by the Ministry of Health is widely regarded as effective and well managed. Anecdotal evidence suggests that these campaigns have begun to have an effect, at least among more educated groups. Broad trends – declining cigarette consumption, declining smoking prevalence, particularly in the better-educated parts of the country and among better-educated individuals – support this perception.

It therefore would appear that:

- social and legal proscriptions on smoking will increase;
- prevalence and consumption will decline faster among more-educated individuals than among less-educated persons;

- advertising will increasingly focus on women and the young; and
- for decades to come (as suggested by Figure II-2) individuals and society will suffer high morbidity and mortality resulting from the recent high prevalence and heavy consumption of cigarettes.

What might the costs and effects of an intensive anti-smoking campaign in Brazil be? It has been estimated that in developing countries the annual cost of a national anti-smoking campaign is between 0.005 and 0.025% of GNP⁽¹¹⁾. In Brazil this would mean from \$12 to \$62 million dollars per year, or just 0.2% to 1% of all spending on health.

What about "benefits"? There are no reliable estimates of benefits in Brazil. In the United States it has been estimated that cigarette consumption in 1987 would have been 80% higher without the national anti-smoking campaign⁽¹⁵⁶⁾. And the effects of smoking on health are dramatic. It is estimated that 25% of smokers die from smoking, with a premature loss of life of about 14 years for each smoking-induced death⁽¹¹⁾.

The costs of an anti-smoking campaign are small and the benefits very large. For developing countries it is estimated that it costs between 2% and 25% of GNP per capita per death averted, and between 0.2% and 2% of GNP per capita per year of life gained (or between 10 and 100 times less than the cost per year of life gained through use of cost-effective curative care)⁽¹¹⁾.

In summary, although precise estimates of costs and benefits are not feasible, it is clear that the potential benefits of a range of anti-smoking measures (including increased taxation, legislation aimed at reducing advertising and prohibiting smoking in public places, and information on the hazards of smoking) are very large and the costs relatively small. Appropriately, an important element of the Brazilian national anti-smoking campaign involves operational research to identify the costs and impacts of different anti-smoking interventions.

Poor Diet and Lack of Exercise

In industrialized countries in recent years, the focus of nutritional concern has shifted from what is not eaten (insufficient vitamins, for instance) to what is eaten. It is now well documented that high levels of

cholesterol in the blood are a major cause of coronary heart disease and it is generally believed that high levels of cholesterol in the blood may be partially controlled through reduced intake of cholesterol (through reduced consumption of animal fats and eggs, for example)⁽¹⁴⁸⁾. It is also believed – but not very well documented – that diets that are low in fiber and high in animal fats account for up to one third of all cancers.

Information on dietary habits in Brazil is patchy and outdated. The last national nutrition survey was conducted in the mid-1970s. At that time, the average Brazilian diet appeared – from this perspective – to be healthy. The average level of animal-fat consumption was substantially lower, and the average consumption of cereals about the same, as that in industrialized countries⁽⁵¹⁾. In the late 1970s, however, a survey of serum cholesterol levels in Porto Alegre found significantly higher-than-recommended levels⁽⁴⁸⁾.

A major problem in interpreting the dietary survey data is the likelihood that, given the extreme inequality of income in Brazil, the distribution about the national average was broader in Brazil than in most other countries.

In the 15 years since the nutrition survey, the diet of most people has changed significantly, but data documenting these changes are not available. It is generally believed that the diet of the middle class has deteriorated substantially with the advent of "fast foods" and canned foods, which have high levels of salt, fats and calories, and little fiber⁽⁴⁾. The diet of the poor has probably changed less, continuing to be low in protein, vitamins and fiber.

Brazilians' awareness of the importance of diet and of what constitutes a healthy diet and healthy body weight is low. Only about 100,000 people are tested for cholesterol each year in Brazil (when international experience would suggest that cholesterol levels should be monitored in about 10% of the population, or 13 million people)⁽⁴⁸⁾.

As with other health risks, the poor appear to be worse off. A recent Pan American Health Organization survey in Porto Alegre showed that about 15% of men and 24% of women are obese, and that obesity is particularly common among poorly educated women⁽⁴⁾. A recent national survey, however, indicates that only 21% of the poor

(versus 36% of the middle class) wish to lose weight⁽⁸⁷⁾.

Finally, despite extensive evidence that heart attacks can be prevented by exercise, only 25% of poor adults exercise regularly, compared with 47% of middle-class adults⁽⁸⁷⁾. A recent study in Porto Alegre shows that regular leisure-time exercise⁽⁴⁾:

- is more common among men (30%) than women (18%);
- just about as common in older (60-64 year old) adults as in young (20-24 year old) adults;
- is twice as common among women with post-secondary school education than among illiterate women.

What of the costs and benefits of interventions designed to improve health through improved diet and exercise? Even in industrialized countries, there is no acceptable estimate of the cost of inducing dietary changes, or the effect of such changes on health. It is broadly accepted, however, that the cost of providing information on the probable beneficial effects of dietary change (reduced consumption of cholesterol and saturated fats, and increased consumption of fiber and fresh fruits) is low and the potential benefits substantial.

A recent study has assessed the cost-effectiveness of exercise programs in the United States⁽⁸⁸⁾. The results depend on how time spent exercising is valued. In one analysis the time of those (35% in the US) who actively dislike exercise the time was valued at the average wage rate and the time of those who liked exercising (55%) was assumed to be zero (with the "enjoyment value" assumed to cancel out the opportunity cost of the time expended). Even when benefits were limited to improved cardiovascular health, this exercise program was roughly as cost-effective (10-70% of GNP per capita per quality-adjusted-life-year – QALY– saved) as relatively cost-effective treatments (such as coronary bypass operations for the left main artery, with an approximate cost of 25% GNP/capita per QALY). In an alternative assessment, in which it was assumed that participation was limited to those who enjoy exercising, the impact per unit cost was much higher still.

This study suggests that exercise programs may often be a cost-effective health intervention. At the minimum, public campaigns aimed at stimulating exercise cost little and appear to have considerable

effect. The feasibility and cost-effectiveness of increasing the supply of exercise facilities (such as swimming pools and jogging tracks) should be assessed. The data from the Porto Alegre study suggest that special attention should be paid to encouraging leisure-time exercise amongst women in general and poor women in particular.

Alcohol and Drug Abuse*

There are serious health risks associated with the consumption of alcohol. Acute effects include traffic accidents (alcohol consumption is implicated in 40% of fatal traffic accidents in the US) and homicide, and chronic effects include cirrhosis, cancers (liver, mouth, tongue and esophagus) and coronary heart disease (for heavy drinkers).

As in many other areas, data on alcohol consumption are inadequate. Data from 1970 showed that the per capita consumption of alcohol in Brazil was one third of that in industrialized countries and one half that in Chile. Studies in other countries have shown that the demand for alcohol is much more elastic than the demand for cigarettes^(112,169), both with respect to price and income, and that these effects are particularly strong for adolescents and young adults⁽¹¹⁶⁾. Thus, the large per capita increases in income in the 1970s in Brazil, must have been accompanied by large increases in alcohol consumption. As with cigarette consumption, it is also likely that alcohol consumption has dropped in Brazil in the 1980s. This effect has probably been particularly marked for adolescents and young adults.

Three population-based studies, conducted in the 1960s and 1970s, suggest that alcoholism is a serious problem in Brazil⁽²³⁾. These studies showed that the prevalence of alcoholism among adults ranges from 6% (Salvador) to 13% (Ribeirao Preto, SP) among males, and is around 1% for females. These rates are not dissimilar to the 1980 rates in the United States (10% for men and 2% for women). A recent study in Porto Alegre⁽⁴⁾ found that 18% of men and 2% of women drink alcohol every day, and that uneducated men are three times more likely than men with post-secondary education to drink daily.

* This section draws heavily on a paper provided for this study by de Almeida Filho and colleagues⁽⁴⁴⁾.

There are indirect indications, too, that alcoholism constitutes a serious health problem in Brazil. Alcoholics account for about 10-15% of all admissions to mental hospitals in Brazil. And, because alcoholism seriously affects work performance, there is demand among progressive companies for alcohol-treatment professionals.

Like alcoholism, illegal drug use is both a social and a health problem in its own right, and is associated with other health problems. In countries with a major drug problem, a substantial proportion of robberies and murders are drug-related. Widespread intravenous drug use constitutes a major public health problem, because shared needles act as an effective transmitter of some pathogens, including the hepatitis B and AIDS viruses.

By all accounts, intravenous drug use in Brazil is very low and does not constitute a serious public health problem. The situation regarding "other drugs" (principally over-the-counter drugs, marijuana and cocaine) is more complex. In recent years, there have been a substantial number of studies of drug use, principally among adolescents and young adults in big cities⁽⁴⁴⁾. Only four of these studies – two in Sao Paulo, one in Salvador and one in Brasilia – can be considered acceptable from a methodological point of view. The findings of these studies are remarkably consistent:

- tranquilizers are the most commonly used drug;
- marijuana is the illegal drug of choice, with the prevalence of recent use about one half that of tranquilizers;
- 2-4% of high school students, and 7-9% of university students reported ever using marijuana,
- between 1% and 3% of respondents had "recently" used marijuana, with the higher prevalence in the population-based survey in Salvador; and
- the prevalence of cocaine use is about one fifth of the marijuana prevalence.

These numbers indicate much lower drug use than in industrialized countries. In the United Kingdom, for instance, 17% of high school students report using marijuana within the last month⁽¹³³⁾, while in the United States, 35% reported doing so in 1979 and 27% in 1982⁽⁶¹⁾.

Three of the four Brazilian studies, however, surveyed high school and university students. This is a highly selective sample in Brazil. There only 1 in 5 persons attends high school. Nevertheless, the findings strongly suggest that, as of the mid-1980s, the drug-epidemic image propagated by the media is not accurate. (A review of well- and poorly designed drug prevalence surveys in Brazil found a much higher prevalence in the poorly designed surveys)(44).

As with most other preventive activities, there is virtually no directly-relevant data on the costs and effects in Brazil. There are, however, indirect indications from Brazil, and data from industrialized countries which suggest that the provision of information on alcohol and drug abuse, and the provision of alcohol and drug treatment programs, are cost-effective interventions.

The indirect evidence from Brazil is that in recent years companies have actively recruited substantial numbers of professionals qualified for treating alcohol abuse among workers(23). The direct evidence is from studies in industrialized countries. In Oklahoma in the United States it is estimated that alcohol treatment programs cost about \$570 per client per year, and that the benefits (in terms of increases in productivity, improvements in health and reductions in automobile accidents, arrests and criminal justice costs) amount to about \$1,300 per client per year(128). Although it is widely assumed that the benefits from information and education campaigns regarding drug and alcohol abuse outweigh the (relatively small) costs, no precise estimates are available.

Hazardous Sexual Practices

As discussed in more detail in Chapter II-4, AIDS represents an ominous threat to public health in Brazil. About 70% of AIDS cases in Brazil are sexually transmitted(25). A recent study by a team including researchers from Rio de Janeiro, Sao Paulo, Santa Catarina and Minas Gerais draws attention to two particularly hazardous aspects of sexual behavior. First, they draw attention to "(the) population of men who have regular intercourse with both men and women"(37). In 1986 the proportion of AIDS patients classified as "bisexual" in Brazil was about 20%, about 10 times the proportion typically seen in Europe and North America(114). The Brazilian AIDS research team(37)

concludes that in Brazil bisexuals are functioning as an effective "bridge" for transmitting AIDS out of the classic high-risk groups to the community at large(37,114,120). Second, the team (and others) draw attention to other sexual practices that contribute to the transmission of AIDS in Brazil(37,114,120).

Surveys in 1985 and 1987 show that awareness of the dangers of certain sexual behaviors is increasing(20). In a 1987 survey, 20% of young adults reported changing their sexual practices because of AIDS. Most impressive is the large increase in reported use of condoms between 1985 and 1987: Condom use increased from 6% to 27% among young males and from 17% to 49% among homosexuals and bisexuals. There is also some evidence that the demand for the services of prostitutes has declined(20).

What of the costs and benefits of AIDS prevention activities? There is little information available on either the costs or impact of AIDS prevention activities, and no published estimates of the cost-effectiveness of such programs. It is, however, believed that the impact and benefits are great, and the costs relatively small.

HAZARDS TO GROUPS OF PEOPLE

Environmental contamination*

During the period of intense industrialization, it was official Brazilian government policy to pay little attention to environmental protection. At the World Environment Conference in Stockholm in 1972 this position was articulated clearly: Brazil would continue to industrialize without concern for environmental problems; only after full economic and social development was achieved would environmental protection be undertaken.

The state of the environment in Brazil can be described with some precision only in selected areas, and, even there, only for selected problems. Not surprisingly, most serious environmental analyses and protection programs have taken place where the problems are most flagrant, and where human and financial resources are most available. Per capita spending on environmental protection in

* A background paper on environmental health was prepared by Nojuiera(109).

Sao Paulo is three times that in any other state. Three quarters of all funds spent in Brazil on environmental protection are spent in Sao Paulo. The Sao Paulo State environmental protection agency, CETESB, is by far the most sophisticated environmental institution in Brazil.

As noted in Part I, the rapid industrial development in Brazil since the 1950s was heavily concentrated in the state of Sao Paulo and, more specifically, in the Sao Paulo-Santos area. By the mid-1980s, the 15 million people, 2 million vehicles and 30,000 industries concentrated in the Greater Sao Paulo metropolitan area (which does not include the Santos area) posed grave air, water and solid and hazardous waste disposal problems.

A complete description of these problems is beyond the scope of this study. However, several examples of the problem help to illustrate the severity of contamination and the effects on health. (In Chapter II-7 some successes in improving air and water quality in the heavily industrialized areas of the state of Sao Paulo will be examined in more detail.)

Air Pollution

Although it has improved significantly in the 1980s, air quality remains poor in Sao Paulo. As shown in Figure II-4, in 1981 air quality standards (Brazilian standards are similar to US and WHO standards) were not met, or only just met, for particulates, smoke and sulphur dioxide, while the carbon monoxide 8-hour standard was exceeded nearly 40% of the time⁽²⁸⁾. In 1985, despite remarkable improvements, air quality was still poor. Annual average particulate and smoke levels still exceeded standards, and the carbon monoxide standard was exceeded 20% of the time⁽²⁸⁾.

Air pollution can have a variety of adverse effects on health. Overall poor air quality is associated with respiratory impairment and lung cancer, while high levels of carbon monoxide can aggravate coronary heart diseases, and high lead levels can increase hypertension.

By the early 1970s, air pollution in the industrialized areas of the state of Sao Paulo was so bad that acute air pollution was actually killing people. On August 1, 1973, for instance, sulphur dioxide and particulate levels were twice the (already high) background levels. Deaths among the elderly and

deaths due to respiratory conditions were 50% higher than normal on that particular day, according to a review of death records⁽¹⁰⁸⁾.

There have been several subsequent studies in the Sao Paulo area documenting the adverse effects of air pollution on health. Cross sectional studies have shown that respiratory morbidity among 12 and 13 year olds follows the air pollution gradient in Sao Paulo⁽¹⁰⁹⁾. The most authoritative study is a recent longitudinal assessment of the effect of the air pollution control program in the industrial city of Cubatao ("the most polluted city on earth", near the Sao Paulo port of Santos) on respiratory capacity of children^(2,71). As illustrated in Figure II-5:

- there were marked improvements in air quality between 1981 and 1985; and
- there were marked reductions in moderate and severe respiratory impairment between 1983 and 1985.

What of the rest of Brazil? While Sao Paulo undoubtedly represents the largest and most serious problem, it also is the only state that has developed a relatively effective response. Little quantitative information is available from the rest of the country. But there is no doubt that serious problems already exist⁽¹⁰⁹⁾. For example, Rio de Janeiro, with 10,000 industries, 8 million people and about a million vehicles, faces many of the same problems as Sao Paulo. In Rio Grande do Sul, the second most industrialized state, the problems are similar. Even in the "backward" Northeast, there are serious air pollution problems, such as heavy sulphur and fluoride pollution from an aluminum plant in Sao Luiz, and high levels of sulphur dioxide in all the metropolitan areas, and especially in Salvador and Recife. Given the totally inadequate capacity and resources for environmental analysis and control outside of Sao Paulo (with the partial exception of FEEMA, the state environmental protection agency of Rio de Janeiro), air pollution will undoubtedly get worse in most metropolitan areas of Brazil in the coming decades.

There is considerably less information on industrial contamination of soil, food and water, not necessarily because these are less serious problems, but because they are (literally) less visible than air pollution.

Solid and hazardous waste disposal

As is the case in industrialized countries, much less is known of contamination with hazardous industrial wastes. As was well illustrated by the nuclear waste tragedy in Goiânia in 1988, hazardous wastes usually are simply abandoned, dumped or discharged into sewage systems. Given the rudimentary nature of information about sources, practices and contamination levels, the clearest indication of a problem is the contaminant levels in human beings. A recent study in São Paulo showed that, despite regulations for the disposal of highly toxic polychlorinated biphenyls, PCBs (mostly from old electrical systems) are simply thrown into sewage or buried, and that the prevalence of elevated levels of PCB in human fat in São Paulo was twice that in industrialized countries⁽¹⁰⁸⁾.

The disposal of hazardous wastes in Cubatão is a source of great concern. A recent case illustrates the problem. A new residential area was located on a reclaimed marsh. After the appearance of a strange skin disease among children living in the area, it was discovered that a multinational chemical company had illegally dumped hexachlorobenzene in the sand that was used for the landfill. And studies have shown that proximity to petrochemical industries in Cubatão is correlated with higher levels of spontaneous abortion⁽¹⁰⁹⁾.

Problems of contamination by toxic chemicals are not confined to industrial areas. There are several well-documented cases of food contamination by pesticides in São Paulo. And a study in the city of Ribeirão Preto in São Paulo⁽¹⁰⁸⁾ state showed that the milk of women not exposed to occupational hazards had levels of various pesticides (including lindane, heptachlor, DDT and DDE) at least 3 times higher than that considered "safe" by the World Health Organization.

Water Pollution

Over the last 20 years, Brazil has made remarkable progress in improving water supply in urban areas, with the proportion of urban households having an in-house connection increasing from 50% in 1968 to 83% in 1988. Progress in providing sewerage has been slower, with the proportion nationally increasing from 30% to 38% over the same period.

In the metropolitan area of São Paulo, the situation is even better: in 1988 90% of houses had water connections, and 59% were connected to sewers. Although it is suspected that illegal and unsanitary connections have resulted in contamination of water supplies in the peripheral areas, and that this has contributed to increases in water-borne giardiasis disease in recent years, generally the São Paulo State Water and Sanitation Authority (SABESP) has an excellent record in delivering safe drinking water.

In industrialized areas, a safe drinking water supply depends fundamentally on protection of the source of that water, since conventional water treatment processes are only partially successful in removing many toxic organic and inorganic chemicals. Partially because the watershed of the "environmental center" of Brazil (the metropolitan area of São Paulo) is, for the present at least, satisfactorily protected from industrial pollution, there is relatively little information on the presence of toxic chemicals in the rivers of Brazil.

The few data available suggest that there are areas in which toxic contamination of water supplies is a serious problem. Perhaps the most worrisome case is that of the Paraíba River, which is the source of drinking water for the eight million people living in the metropolitan area of Rio de Janeiro⁽¹¹⁰⁾. Studies by the Rio State Environmental Protection Agency (FEEMA) have shown that heavy metals – including lead, cadmium and nickel – are present in significant amounts. Some solace may be drawn from the fact that these levels are "only" 10% of the levels in polluted European rivers (specifically the Rhine). However, unlike in industrialized countries, such heavily contaminated rivers are used directly for drinking water in Brazil.

Similar disturbing findings have been made in the state of São Paulo⁽¹⁰⁸⁾. Studies by CETESB have shown that over 60% of fish in the Tiete and Piracicaba Rivers in the São Paulo metropolitan area have mercury levels above the limits considered safe (0.5 ppm), and that 80% of fishermen and their families who live near these rivers have elevated mercury levels. In southern São Paulo, CETESB detected lead levels over 70 times higher than the allowed limit in the Ribeira de Iguape River, which is an important source of drinking water in the area.

Although water pollution problems are unquestionably most serious in urban areas, there

are problems in rural areas, too⁽⁸⁾. In Mato Grosso do Sul, for example, large amounts of pesticides are used in the growing of soya beans. The residues from these pesticides are transported (along with large quantities of topsoil) to the inland marsh, the "Pantanal", where they have become incorporated into the food chain.

Even the formerly pristine Amazon Basin is suffering the effects of industrial pollution. Large-scale extraction of iron, manganese, bauxite and many other minerals by national or multinational companies is taking place without waste disposal. And over the last decade, the Amazon Basin "gold rush" has resulted in heavy mercury contamination of river water⁽¹¹⁷⁾. Mercury levels among goldminers themselves, and among Indians living in areas affected by goldmining, are already several times those of Brazilians living in urban areas⁽⁴⁰⁾.

In summary, then, from the rich data available for Sao Paulo and the glimpses of reality from other parts of the country, it is evident that Brazilians face ominous environmental health threats. The one ray of hope is the experience of CETESB in Sao Paulo, which shows that, with commitment and resources, it is possible to effect major environmental improvements in Brazil.

What of the costs and benefits of these interventions? Taking just the example of air pollution, in the early 1980s it was estimated that the cost of improving air quality in metropolitan Sao Paulo to meet existing standards was between \$1 and \$5 per year per capita⁽¹⁴⁷⁾. In 1987 total per capita spending on environmental protection was just US\$0.43 in Brazil as a whole (with the highest spending being US\$1.46 per person in the state of Sao Paulo)⁽¹⁰⁸⁾.

There are multiple benefits from improving air quality. In the early 1980s it was estimated that a reduction of 50% in industrial particulates alone in Sao Paulo would reduce mortality rates by over 1%⁽¹⁴⁷⁾. In addition, in Brazil as elsewhere, there is substantial, and increasing, awareness of the importance of environmental quality, and willingness to pay for the amenity benefits of improved environmental quality.

Occupational hazards*

Just as little attention was paid to the environment, in the headlong race for industrialization there was little concern for the new occupational risks to which workers were subject.

Injuries

By the early 1970s, industrial injuries were extraordinarily common: about 18% of industrial workers suffered injuries each year. The major causes of these injuries were machinery, transport, and lifting and lowering materials. Almost half of reported injuries resulted in permanent incapacity⁽¹¹⁰⁾.

Compiling an accurate picture of the evolution of occupational injury rates is difficult. Under-reporting is a chronic phenomenon. Occupational health professionals generally believe that only about one third of all occupational injuries in Brazil are reported. Furthermore, the extent of under-reporting has probably changed over time. A law passed in 1976 made employers pay for the first 15 days of absence due to injury and resulted in further under-reporting of acute injuries. Because of this change, it is difficult to compare pre-1976 and post-1976 rates. Nevertheless, a comparison of 1969-72 rates with 1973-76 rates and 1981-84 rates (Figure II-6) suggests that there have been consistent and significant reductions in occupational injuries in the formal industrial sector⁽¹¹⁰⁾.

Three main factors account for these improvements: legislation protecting workers' health in establishments with more than 50 workers and enforcement of this legislation; the training of 15,000 occupational safety and health personnel; and the rise of independent trade unions that made worker safety a central concern in collective bargaining agreements⁽¹⁰⁷⁾.

Progress in reducing industrial injuries, however, has not been uniform. The situation is much better in the formal sector (which includes only about a half of the work force) and, more specifically, among larger enterprises. In part this is because the occupational safety legislation only covers industries with more than 50 employees, and in part because labor is more organized and better able to

* A background paper on environmental health was prepared by Nogueira⁽¹¹⁰⁾.

press for worker safety in large formal sector industries. Injury rates in enterprises with less than 100 workers were almost four times the rate in enterprises with more than 500 workers. The true differences are probably even greater, since under-reporting is even more serious in small enterprises⁽¹¹⁰⁾

Even less reliable information is available on occupational injuries in the agricultural sector. The most recent national survey of agricultural accidents was in the mid-1970s, when rates were about 40% lower than industrial accident rates. The majority of the injuries were on sugar-cane plantations, where 1 in 4 workers suffered an accident each year. It appears that since then there have been substantial advances in the modern agricultural sector in the Southern and Southeastern Regions, but that there has been little progress in most other parts of the country.

Although there have been improvements in certain areas, the overall rate of occupational injuries in Brazil is still very high. The reported occupational death rate in Brazil is five times the rate in industrialized countries⁽⁹³⁾.

Exposure to harmful substances

Workers in Brazil are at risk from the classical occupational hazards of exposure to asbestos and toxic chemicals in industry, construction and transport, and to pesticides in agriculture, and appear to suffer from the consequences at rates at least as high as those common in industrialized countries before the initiation of industrial safety programs^(93,110). To cite just a few examples, clinical examinations have shown that:

- about 6% of coal miners in the southern state of Santa Catarina suffer from black-lung disease (a rate similar to that among coal miners in the Appalachians in the US);
- 16% of workers at an asbestos cement factory in Leme in the state of Sao Paulo were found to have asbestosis (which causes lung scarring and incapacity and, eventually, lung cancer).

The quantity of toxic chemicals used in agriculture increased five-fold between 1964 and 1978, and another 25% by 1987 to reach 100,000 tons. By all accounts, this increase has not been accompanied by improved procedures for protecting workers and consumers. An investigation by the University of Campinas in Sao Paulo and a separate study in the

Santa Rosa district of Rio Grande do Sul show alarming levels of toxic poisoning, with about 20% of workers showing some effects. Not surprisingly, indiscriminate use of pesticides affects consumers as well as workers. As discussed earlier, mothers' milk in Riberao Preto in Sao Paulo has shown unsafe levels of several important pesticides.

As discussed further in Chapter II-6, mortality rates for virtually all causes and at virtually all ages are higher for the poor and less educated and for blue collar workers. While it is not possible to isolate the independent effects, it seems certain that exposure to environmental hazards in the workplace plays a substantial role in these differences.

Finally, it should be noted that employers pay the social security system about US\$350 million annually (about 4% of the social security budget, and over 10% of the budget for social security financed health services) as insurance against occupational disease⁽¹¹⁰⁾. Virtually all of this money is spent for compensation, treatment and rehabilitation of victims. Less than 1% is used (through FUNDACENTRO) to improve occupational safety.

Rehabilitation services for disabled workers are run primarily by the social security system, which rehabilitates an average of about 3,500 disabled workers a year. (The Social Service of Industry (SESI), funded by employers, runs three modern and well-equipped rehabilitation centers in Sao Paulo, but accounts for less than 10% of all rehabilitations.) Although meeting only a very small proportion of the likely total need, the quality of the rehabilitation centers is good, with over 80% of rehabilitated workers returning to work⁽¹¹⁰⁾.

As is the case with many other interventions, no reliable estimates were found of the cost-effectiveness of the programs for promoting occupational health, in Brazil or elsewhere.

INTERACTIONS AMONGST RISKS*

Since there is no systematic collection of data on chronic disease risks in Brazil, there is little information on the interaction of these risks. Other

* This section draws heavily on background information provided for this study by R. Rothenberg of the Centers for Disease Control, Atlanta, United States.

sources, however, highlight the importance of the combined effects of risks. Studies in the United States have demonstrated that an individual with three major coronary risks (smoking, hypercholesterolemia and hypertension) has a 10-year risk of developing a coronary event that is over eight times higher than that of a person with none of the three risks, and almost twice the level that would pertain if there were no interaction.

Moreover, risks tend to be aggregated in particular individuals. In the United States these risks are aggregated almost twice as often as would be expected under the hypothesis of independence. One consequence of this risk aggregation is that there is particular benefit from targeting groups who, because of a multiplicity of risks, are particularly vulnerable.

What are the implications for Brazil? First, Brazil is simultaneously dealing with the behavioral risks of the post-transition period and heavy burdens of environmental and occupational risk. In such circumstances, the multiplier effect suggests a particularly heavy burden of chronic diseases in the population. Second, because (as shown in Chapter II-6), it is among the poor, particularly, that risks are aggregated, the highest priority should be to target interventions specifically to reduce the risks faced by the poor.

CHAPTER II-4: MAJOR CAUSES OF DEATHS AMONG ADULTS: LEVELS AND TRENDS

In recent decades there have been major changes in the causes of death in Brazil. As shown in Figure II-7, the proportion of deaths due to infectious and parasitic diseases has fallen steadily from 45% in 1930 to about 11% in 1980, while the proportions due to cardiovascular diseases, cancers and injuries have risen steadily. Figure II-8 shows, for each region, the probability that a person who faces current mortality risks throughout his life, will die from a cardiovascular disease, cancer and injury.

When the whole of life is considered, the effect of cardiovascular diseases is dominant: For Brazil as a whole, 38% will die of a cardiovascular disease, with the probability varying from about 20% in the North-east to nearly 45% in the Southeast. About 10% will die from cancer and about 5% from injuries. For the "productive adult years" (ages 15-64), the picture is somewhat different. About 30% of those who die in this age group – a crucial one from an economic and social point of view – will die from cardiovascular diseases, and about 15% each, from injuries and cancers.

An authoritative study of mortality in 43 industrialized and developing countries⁽¹¹⁸⁾ found that countries with similar life expectancies have similar cause-of-death structures. In the sections in this chapter on the major causes of death, the role of the particular cause of death in Brazil is compared with the role that would be expected for a country "like" – in terms of life expectancy – Brazil. This comparison will show that Brazil is unusual in the following respects:

- cardiovascular death rates are unusually high in the developed parts of the country;
- injury rates are much higher than the norm in all regions (except the Northeast); and

- throughout the country cancer rates are slightly lower than would be expected (except in the North).

In the sections that follow, the levels, risk factors and trends for the major post-transitional causes of death in Brazil are examined in detail.

Cardiovascular diseases* +

Levels:

Death rates from cardiovascular diseases (CVD) are high in Brazil, as shown in a recent comparison⁽⁸⁶⁾ of (age-corrected) CVD rates for Sao Paulo with those for 27 industrialized countries (Table II-2).

Table II-2: Cardiovascular death rates in Sao Paulo and 27 industrialized countries

	Men	Women
CVD Overall:		
SP rank (out of 28)	5th highest	2nd highest
SP rate/median rate	40% higher	75% higher
Coronary:		
SP rank (out of 28)	15th highest	11th highest
SP rate/median rate	15% lower	15% higher
Stroke:		
SP rank (out of 28)	5th highest	2nd highest
SP rate/median rate	110% higher	125% higher

Source: Lollo et al (86)

* Background papers on cardiovascular diseases were prepared by Laurenti and Lollo⁽⁸⁴⁾ and Sousa e Silva⁽¹³⁹⁾.

+ The standard 9th revision of the International Classification of Diseases⁽¹¹³⁾ (ICD) is followed in Brazil. Thus cardiovascular diseases refers to ICDs 390-458, ischemic heart disease or coronary disease to ICDs 410-414, and cerebrovascular disease or stroke to ICDs 430-438.

This is true for both coronary heart disease and stroke (each of which accounts for about one third of all CVD deaths in Brazil). The rates are particularly high for:

- women due to all CVD causes; and
- stroke in both men and women.

Are these relationships surprising, given the fact that per capita GDP in Brazil is lower than in most industrialized countries? As will be discussed in greater detail in Chapter II-6, it would be predicted, on the basis of a multi-national comparison, that overall cardiovascular death rates would be lower in Brazil than in industrialized countries, but that cerebrovascular death rates would be somewhat higher. In fact, as shown above, overall CVD rates are higher for Brazil than the typical industrialized country, and stroke rates are more than twice as high.

The proportion of total deaths attributable to cardiovascular diseases has risen steadily over the past 50 years⁽¹²⁾ (Figure II-7). Currently, cardiovascular diseases are by far the leading cause of death in Brazil, accounting for about 33% of deaths in the country as a whole and even higher proportions in the more developed South and Southeast regions⁽¹³⁾ (Figure II-9). In addition to being the primary cause of death, Table II-1 shows that CVDs cost more to treat than any other disease syndrome in Brazil and are the leading cause of premature retirement.

CVDs are not confined to the elderly. Indeed, CVDs are by far the leading cause of death among the working age population in Brazil. About 30% of those who will die between ages 15 and 64 will die from a CVD. Cardiovascular diseases account for about 13% of "years of potentially productive life" lost in Brazil⁽¹⁴⁾.

How does the role of cardiovascular diseases in Brazil differ from that which would be expected on the basis of the experience of other countries? In Brazil as a whole, as shown on Figure II-10, a person facing current age- and cause-specific mortality risks throughout his life has about a 38% probability of dying from a cardiovascular disease. This probability can be compared with the pattern – as derived in the multinational study⁽¹⁵⁾ – for a "typical" country with Brazil's overall life expectancy. In the more developed areas of the country (the South, Southeast and Center-West), the actual rates are significantly higher (about 10% higher in the

Southeast, for instance) than would be predicted, while in the poor areas (the North and Northeast), the probability of dying from a cardiovascular disease is somewhat lower than would be expected.

Risk Factors:

Why are CVD rates so high in Brazil? Probably because of the relatively high levels of virtually all the classic risk factors for these diseases (smoking, obesity, lack of exercise, poor diet and hypertension) and because of the existence of some special risks (Chagas' disease and excessive use of oral contraceptives)⁽¹⁶⁾. As was pointed out in Chapter II-3:

- the prevalence of smoking and the quantity of cigarettes smoked, which rose sharply for decades, are declining for the population as a whole, but rising among young women;
- the quality of the diet of both the poor and the middle class seems to have deteriorated in recent decades and knowledge of the effects of diet on health is limited;
- leisure-time exercise is becoming more common among the middle class;
- the levels of virtually all risk factors for CVD are much higher among the poor.

High blood pressure is a particularly important risk factor for cardiovascular diseases. Although considered a primary cause of mortality in only 2% of adult deaths in Sao Paulo, hypertension is an associated cause of about 30% of deaths among adults. Studies in Rio de Janeiro, Rio Grande do Sul and Sao Paulo show that the prevalence of high blood pressure in adults is high (about 12%), with rates increasing sharply with age ⁽¹⁷⁾. From national prevalence studies of those seeking medical care, it appears that these high rates are consistent throughout the country.

What of the "special" CVD risk factors that affect Brazilians, namely, Chagas' disease and the high prevalence of oral contraceptive use? First, Chagas' disease is a parasitic disease that is endemic in Brazil. The prevalence is high (about 4% nationally)⁽¹⁸⁾, particularly among poor people who have lived in rural areas. Long-term infection, which can cause disorders of the heart muscles, is probably an important underlying cause of the high CVD rates in Brazil.

The prevalence of oral contraceptive use in Brazil is high because of limited availability of alternative

family planning methods. About 36% of women who use some contraceptive method use the pill⁽⁸¹⁾, a level twice that in the United States. Contraindications, which include hypertension, obesity, smoking, age and length of use, are frequently either ignored by the physician or unknown to women who self-prescribe the pill. The high level of pill use is probably partly responsible for the fact that stroke is the leading cause of death among women of childbearing age⁽⁸⁴⁾.

Trends

Longitudinal studies in Rio Grande do Sul and Sao Paulo show that age-standardized CVD death rates have been falling since 1970. In Sao Paulo, between 1970 and 1983, death rates for coronary attacks and strokes dropped by 26% and 17%, respectively⁽⁸⁵⁾. The causes for these declines (which are similar to declines experienced in most industrialized countries) are not known. More specifically, the relative contributions of improved medical treatment and "spontaneous" prevention (through changed life style) are not known.

The trends in risk factors for CVDs are mixed, with some (specifically smoking and leisure-time exercise) showing a general improvement, while others (such as hypertension control, diet, diabetes and use of the pill) show few signs of improvement. It seems likely that over the next few decades, age-specific rates will continue to go down significantly among the middle class, but that little improvement will occur among the poor. The net effect is expected to be a gradual decline in age-corrected CVD death rates.

Cancers*

Levels

Cancer is not a specific sickness, but a process common to a heterogeneous group of diseases, with wide variations in etiology and epidemiology. Accordingly, an understanding of the overall dynamics of the syndrome "cancer" requires attention not just to overall rates, but also to levels and trends in those cancers that are, or may become, major causes of sickness and death.

* Background paper on cancers were prepared by Faerstein and colleagues⁽⁸¹⁾ and the National Cancer Control Program⁽⁸²⁾.

Overall death rates due to cancers are high in Brazil. In the cities of the South and Southeast, standardized cancer mortality rates are similar to those in North American and European countries, while in the poorer cities of the Northeast, rates are higher than is typical for less-developed countries. Nevertheless, as shown in Figure II-11, the probability of dying from cancer is somewhat lower than would be expected given overall life expectancy in Brazil. This is so particularly for the Northeast.

Cancers are an important cause of death for those dying in the economically productive years. The probability that someone dying between ages 15 and 64 years of age will die of cancer is about 15% (Figure II-8).

Cancers already account for 10% of all deaths in Brazil, with the proportion substantially higher in the more-developed regions (14% in the South, for instance) than in the less-developed regions (7% in the Northeast). Overall, for those dying between age 1 and 64, cancers account for about 10% of "years of potential life lost" in Brazil⁽¹⁴⁾.

The most important types of cancer deaths (see Figure II-12) are lung, stomach and breast cancers⁽¹⁰¹⁾. The prevalence of different types of cancers varies widely in different parts of the country. As Figures II-13 and II-14 illustrate, the "cancers of development" (such as lung, colon and breast cancers) predominate in the more-developed parts of Brazil, while the "cancers of underdevelopment" (such as cervical and stomach cancers) are most important in the poorer parts of the country⁽⁸¹⁾.

Although not an important cause of death, skin cancer is the most common type of cancer in Brazil, accounting for about one quarter of all cancers identified. Despite high rates of exposure to sunlight, skin cancer rates in Brazil are much lower than those in other sun-exposed populations (such as Los Angeles)⁽⁸¹⁾.

Risk factors

With regard to the "classic risk factors" for cancers, the situation can be characterized as follows⁽⁸¹⁾:

- after rising sharply for decades, the prevalence of smoking and the quantity of cigarettes smoked are declining for the population as a whole;

- while historically men have been more frequent and heavier smokers than women, the differences are narrowing, and more adolescent girls than boys are smoking;
- dietary risks for cancer (high consumption of fats and meat, low consumption of vegetables and fiber) were at moderate levels in the mid-1970s, but appear to have been increasing since among all social classes;
- falling fertility – the number of children born to the average Brazilian woman declined by 45% between 1965 and 1985⁽⁵⁰⁾ – has meant an increase in the average women's age when she gives birth to her first child and consequently an increase in the risk of breast cancer⁽⁵¹⁾;
- the prevalence of oral contraceptive use, and particularly self-prescribed use among the poor, is high and increasing, and constitutes a cancer risk.

In addition, the interactions of these individual risk factors with the currently high levels of environmental contamination in the workplace, in food and in the air and water is likely to have serious effects⁽⁵⁰⁾.

Trends

Although age-adjusted cancer rates have changed little over the last 50 years in Brazil (as shown in Figure II-15), rates are going to increase substantially in coming decades because:

- this has been the pattern in industrialized countries, where standardized cancer rates increased by about 20% between 1960 and 1980;
- the "cancers of development" (such as lung and breast cancer), which will increase over time, are already major causes of death, (see Figure II-12), while the "cancers of underdevelopment" (such as cervical cancer), which will tend to decrease over time, are relatively less important;
- rates for lung cancer (which has been the principal "cancer of change" in industrialized countries) have increased sharply in recent years in Brazil in general and in the more developed parts of Brazil in particular (Figure II-16);
- these changes are obviously (Figure II-2) related to heavy smoking in prior decades;
- changes in risk factors (especially smoking, but also deteriorating diet, exposure to pollution, reduced fertility and consumption of oral

contraceptives) all point towards increases in cancer rates.

Injuries* +

Levels

Deaths due to injuries (including traffic accidents, homicide, drowning, suicide, industrial accidents, falls and burns) account for about 13% of all deaths in Brazil. For each region of the country (except the Northeast), death rates due to injury are much higher – about 15% higher for Brazil as a whole – than would be predicted on the basis of life expectancy (Figure II-17).

Deaths due to injuries are particularly important in the productive years of life, accounting for over 60% of mortality in the 15-30 year age group in Brazil (Figure II-18). Injuries constitute the leading cause of "years of potentially productive life lost" between ages 1 and 64, accounting for 19% of the total lost⁽¹⁴⁾.

Motor vehicle accidents and homicides are the two dominant causes of injury deaths. In 1983 they accounted for about 31% and 26%, respectively, of all deaths due to injury for which the cause of death is known (Figure II-19).

Over the years of the "economic miracle", the number of vehicles per capita in Brazil increased 10% per year. During the 1980s per capita increases have still been substantial (averaging 3% per year). In 1987 there was about 1 vehicle per 10 Brazilians.

As Figure II-20 shows, the period of "automobilization" coincided with rapid rises in traffic-related death rates. In Sao Paulo, age-standardized traffic death rates more than doubled during the 1960s. Since the early 1970s in Sao Paulo, and since the late 1970s in Brazil as a whole there is evidence that Brazil has, to some degree, "learned to live with the automobile". Crude death

* A background paper on injuries, or "external causes", was prepared by Jorge⁽⁷⁶⁾. This section also draws heavily on other papers by Jorge⁽⁷²⁻⁷⁵⁾.

+ Included in this category are the International Classification of Diseases⁽¹¹³⁾ categories E800-E999. This category is sometimes referred to as "accidents and violence"⁽¹¹³⁾ and, in Brazil, as "external causes" of death.

rates from traffic accidents in 1987 are about the same as 1980 rates.

Motorcyclists constitute a special high-risk group. In Sao Paulo, accident rates involving motorcycles are twice those for other vehicles. Motorcycle deaths account for about 10% of all traffic-related deaths in Sao Paulo⁽⁷⁶⁾.

Although the years of dramatic increases appear to be over, death rates from traffic accidents in Brazil remain very high. Although overall per capita death rates tend to be higher in higher-income countries, the crude rate in Brazil (about 20 per 100,000 per year) is similar to that of the United States and much higher per vehicle and per mile driven. The composition of deaths in Brazil, however, is quite different from that in industrialized countries in several important respects⁽⁷⁷⁾.

First, as is evident from Figure II-21, pedestrian deaths constitute a far larger proportion of total traffic deaths in Brazil (43%) than in the United States (15%). A detailed comparison⁽⁷⁸⁾ of pedestrian deaths in urban Brazil (Rio de Janeiro) and the urban United States (Baltimore) in the early 1970s showed that those who were less capable of dealing with traffic (children under age 10, the elderly, and the intoxicated) accounted for three of every four pedestrian deaths in Baltimore, but only one of four pedestrian deaths in Rio de Janeiro. The task for a pedestrian in crossing the street was much more difficult in Rio than in Baltimore.

As has happened in other countries, as the degree of motorization increased in Brazil, so the proportion of pedestrians among road casualties declined (from about 70% in 1970 to about 50% in 1981). During the decade of the 1970s, while overall death rates in the major metropolitan areas declined by about 20% (see Figure II-22), adult pedestrian death rates declined by about half for virtually all age groups. Adult pedestrian death rates in urban Brazil nevertheless remain two to three times greater than the rates in the urban United States.

Homicide rates in Brazil are very high^(79,141). In 1984 the country's crude homicide death rate was about twice that of the United States, about ten times that of Canada, and about twenty times that of industrialized countries in Europe. Murder rates in the metropolitan areas are particularly high, with the rate in Sao Paulo being twice the national average. In the early 1980s, murder became a more

important cause of death than traffic accidents in Sao Paulo; by 1984 50% more Paulistas were murdered than died from traffic accidents (Figure II-23). And rates continue to soar. In early 1989, the murder rate in Rio de Janeiro -- 528 murders in the month of April alone⁽²²⁾ -- was three times the 1983 level⁽⁸⁰⁾.

Finally, although the quality of data on suicides is poor, suicide rates in Brazil are low (about 4 per 100,000 in Sao Paulo) and have fallen overall in recent decades⁽⁷⁶⁾.

How do injury-related deaths in Brazil look when compared to the "typical" international pattern? As shown in Figure II-17, in Brazil as a whole, a person facing 1980 mortality risks throughout his life has about a 6% probability of dying from an injury. The probability that a person will die from injury is substantially higher (with the exception of the Northeast) than would be predicted on the basis of international experience.

As is the case throughout this study, existing data necessitates that the focus be on causes of mortality. If and when better data on disability and morbidity become available, the relative importance of different threats to health is likely to change. For instance, there are 10 traffic-related deaths for every burn-related death in Sao Paulo, but a survey of the institutionally disabled showed that burns accounted for as much long-term disability as traffic accidents.

Risk factors

In Brazil it is young adults (Figure II-18) who are at greatest risk of injury-related deaths. More specifically, it is young adult males, whose injury-related death rates are 5 times those of young adult females. More specifically still (as discussed further in Chapter II-6), it is poor young adult males who suffer most from injuries.

The profile of pedestrians who are killed in the United States is strikingly different from that of pedestrians who are killed in Brazil. In the US it is primarily pedestrians who are impaired by alcohol or age who die; in Brazil it is primarily sober adults who die. In short, it is much more dangerous to be a pedestrian in Brazil than in the United States, due to a combination of reckless driving and lack of adequate pedestrian crossings and other design safeguards⁽⁸¹⁾. Although data are not available,

indirect evidence (such as increased traffic fatality rates on weekends and in December) suggest that alcohol consumption by drivers plays an important role in traffic deaths in Brazil as it does for all countries for which adequate data exist⁽⁷⁶⁾. In the US, for instance, about half of fatally injured drivers have elevated blood alcohol levels.

There appear to be several factors that partially explain high homicide rates: poverty, cultural acceptance of violence, substance abuse, the availability of lethal instruments, increasing competition for control of the drug trade, and ineffectiveness of the criminal justice system.

There is strong cross-sectional, and weak but supportive longitudinal, evidence of the importance of poverty as an underlying factor for homicide in Brazil. Homicide rates in Rio de Janeiro and Sao Paulo are much higher among the poor than among the middle class^(127,142). And the Homicide Department of the City of Sao Paulo reported a 40% drop in the murder rate during the (temporary) prosperity of the Cruzado Plan period (in 1986).

Anecdotal and indirect evidence suggests that alcohol consumption is a factor in a substantial proportion of homicides. Saturday and Sunday, the days of peak alcohol consumption, are also the days when murders are most common. During the two days prior to the municipal elections of 1988, when the sale of alcohol in bars was forbidden, there was a marked decline in reported homicides in the State of Sao Paulo.

These underlying causes also lead to other forms of violence (such as domestic violence and the abandonment of children). Anecdotal evidence suggests that these other manifestations of social pathology, also, are increasing rapidly in Brazil.

As in the United States, a major proportion of homicides are committed with guns. In 1980 in Sao Paulo City and the State of Rio de Janeiro, guns accounted for 72% and 90%, respectively, of those homicides in which the murder weapon was reported. In the mid-1970s in Sao Paulo the majority of murders were committed in the home. Throughout the 1960s and 1970s, however, the proportion of murders in public places increased; by 1980 the proportion of murders in the home had dropped to 35% in Sao Paulo, while over 50% occurred in public places⁽⁷⁶⁾.

As is the case in major cities in the US, drug-related murders appear to be responsible, in part, for recent dramatic increases in homicide rates.

Trends

In recent decades, traffic death rates in Brazil first increased dramatically, then declined somewhat, and, in the 1980s appear to have plateaued at relatively high levels (Figure II-20). Over this period, the composition of deaths has changed, with pedestrian deaths declining from over 70% to about 50% of all deaths⁽⁷⁶⁾, a trend that may be expected to continue as Brazil becomes more motorized.

Murder rates in Brazil as a whole and in urban areas in particular, have increased dramatically in the 1980s (Figure II-23) from already high levels. By about half of all deaths among young adult males in the city of Sao Paulo, were homicides, and in the subsequent 5 years rates have increased substantially.

AIDS*

Levels

Since the first AIDS case was diagnosed in Brazil in 1982, over 5000 cases have been reported, the third largest number – after the US and France – in the world. In December 1988 an estimated 60,000 Brazilians were infected with HIV, the virus that causes AIDS. The AIDS incidence rate increased from 0.05 per million in 1982 to 14 per million in 1988. For Brazil as a whole, the cumulated number of AIDS cases per capita is about 20% of the number in the US. The rate in Sao Paulo State is about 5 times the national average⁽¹⁰⁰⁾.

As shown in Figure II-24, cumulated rates per capita vary widely in Brazil. Although over three quarters of all AIDS cases have occurred in the cities of Sao Paulo and Rio de Janeiro, the proportion from these two cities dropped from 83% in 1984 to 49% in 1988⁽¹⁰⁰⁾.

* A background note on AIDS was prepared by Castilho⁽²⁴⁾. This section also draws heavily on papers by Castilho and colleagues^(25,26,31)

Risk factors

The World Health Organization has described two major AIDS transmission paradigms. The first is the pattern seen in North America and Europe, where transmission is primarily among homosexuals and intravenous drug users, and where rates are much higher among men than women. The second is seen in Africa, where transmission is primarily among heterosexuals and where rates among women are similar to rates among men.

It appears that a new transmission paradigm, representing a combination of these two patterns, is emerging in Brazil and several other Latin American countries⁽¹²⁰⁾, in part for the reasons discussed in Chapter II-3. Studies in Brazil have shown that:

- the proportion of AIDS patients classified as "bisexuals" (about 20%) is about 10 times the proportion typically seen in Europe and North America⁽¹¹⁴⁾;
- the prevalence of the HIV virus in men who define themselves as bisexual (28%) is as high as that in homosexual men⁽³⁷⁾;
- between 1984 and 1988 the proportion of heterosexually transmitted cases has increased rapidly (from 5% to 17%)⁽³⁷⁾;
- among heterosexually transmitted cases, the male/female ratio decreased from 4:1 to 2:1 between 1984 and 1988⁽³⁷⁾; and
- the prevalence of the virus in female prostitutes who do not use drugs is higher than in the US, and as high as that in African prostitutes in early 1980s⁽³⁷⁾.

In any setting, the critical question for the spread of AIDS is whether a "bridge" exists between the homosexual and drug-using communities (that are at high risk throughout the world) and the population at large. In Brazil intravenous drugs will probably not act as an efficient "bridge", since addiction rates are relatively low. However, it is now apparent from both anthropologic^(20,114) and epidemiologic^(37,120) evidence that bisexual men in Brazil are functioning as a "bridge" to the general society, and that HIV transmission among heterosexuals, including women, will become widespread.

Trends

Predicting the future of the AIDS epidemic in any society is highly problematic. Simple extrapolations suggest that in 3 years the cumulated number of

AIDS cases in Brazil will be 6 to 15 times higher than current levels⁽³¹⁾. Of even greater concern, however, is the anthropological and epidemiological evidence indicating that AIDS in Brazil will not be confined to a relatively small "high-risk" group, but is spreading, and will continue to spread, into the general population. The epidemiological trends are ominous.

Diabetes*

Diabetes is a predisposing factor to a large number of chronic medical problems. Comparing the prevalence of serious health problems among diabetics with the prevalence in the general population⁽⁵⁵⁾:

- blindness and amputations in diabetic persons under 45 years of age are more than 20 times more common;
- incapacity is 2 to 3 times higher;
- hospitalization rates are more than twice as high and hospital stays longer;
- life expectancy is about 30% shorter.

Levels

The prevalence of insulin-dependent diabetes is about 3.6 per 100,000 for youths in the interior of Sao Paulo, a figure that is at the low end of the (fairly wide) spectrum for industrialized countries⁽⁵⁵⁾.

A recent study of the prevalence of diabetes in adults in state capitals in Brazil shows levels that are moderate by industrialized country standards, and that range from 2.5% (in Fortaleza) to 7.6% (in Sao Paulo)⁽⁵⁵⁾. In Sao Paulo diabetes is diagnosed as the primary cause of death in 2% of deaths, and is an associated cause in about 10% of all deaths.

In Sao Paulo almost a half of adult diabetics are unaware of their condition. The disease would presumably be detected much later when the likelihood of complications was greater.

Risk factors and trends

In Brazil, as in other countries, the prevalence of diabetes is higher among the poor, the uneducated and the elderly than among other groups⁽⁵⁵⁾.

* A background paper on diabetes was prepared by Franco⁽⁵⁵⁾.

The prevalence of diabetes has been increasing both in industrialized and developing countries in recent years, apparently largely as a result of increased survival of those with diabetes. The same phenomenon is undoubtedly occurring in Brazil.

In Sao Paulo age-standardized mortality rates for diabetes increased substantially between 1930 and 1960, and have been more or less stable since. Crude death rates due to diabetes are about 16 per 100,000 in Brazil. Diabetes accounted for over 2% of all deaths due to known causes in Brazil in 1983⁽⁵⁵⁾.

Chronic Obstructive Lung Diseases*

Levels

Chronic obstructive lung diseases (COLD), the most important of which are chronic bronchitis and emphysema, account for about 1% of all deaths in Brazil, and about 1.5% of deaths in people over 50 years of age. These levels are much lower than those in some industrialized countries. (In the United Kingdom, for instance, COLD accounts for 17% of deaths among men and 8% of deaths among women.) COLD is more prevalent in the South and Southeast regions, with the highest prevalence (about 5%) in Rio Grande do Sul^(33,126).

Risk factors

The major risk factors for COLD are tobacco smoking, industrial air pollution and indoor air pollution. In spite of the lack of official data, COLD is believed to be more prevalent among the poor because⁽¹²⁶⁾:

- poor people smoke as much as rich people;
- poor people smoke cheap, and consequently more toxic, brands of cigarettes;
- poor people smoke their cigarettes down to the very end, and cigarette toxicity increases exponentially as the incandescent tip approaches the lip;
- poor people, are exposed to heavy passive smoking and to airways infections due to overcrowded living conditions.

Trends

* A background paper on COLD was prepared by Rigatto⁽¹²⁶⁾.

COLD was rare in Brazil at the turn of the century, both because life was short and because the prevalence of risk factors was relatively low. Although rates have increased over time, no major changes are expected in the coming decades. The prevalence of COLD appears to be stable among men but increasing (due to recent smoking increases) among women. On the one hand, rates would be expected to fall because the prevalence and quantity of smoking are likely to fall. On the other hand, crowding and exposure to outdoor and indoor air pollution are likely to deteriorate, especially for the poor⁽¹²⁶⁾.

CHAPTER II-5:

PROJECTIONS: THE LIKELY STRUCTURE OF MORTALITY UNTIL 2020*:

What is the likely evolution of the major post-transition causes of death over the next 30 years? To address this question some simple but realistic "projections" ("illustrative scenarios" would probably be a more appropriate description) were made to assess the weight of the dominant new diseases in mortality over the next 30 years as follows:

- Age-corrected death rates due to cancers, cardiovascular diseases and injuries and "other causes" were calculated from available national data from 1940 to 1980;
- The trends in these age-corrected rates were examined in conjunction with qualitative information on trends in exposure to risk factors, likely latency periods and trends in industrialized countries, and "projections" were made for these age-corrected rates over the next 30 years;
- The total numbers of deaths due to these causes were estimated by applying the age-specific rates to the population structure projected for the next 30 years;
- The likely proportionate contribution of these causes of mortality over the next 30 years were assessed; and
- The increases in per capita medical treatment costs as a result of the changes in the age composition and disease composition were estimated.

Scenario 1: The effects of age structure:

The first scenario assesses the effects of age-structural changes alone on the mortality profile of the population. Age-specific mortality rates for 1980^(99,98) are applied to the age structures projected for 2000 and 2020⁽¹²³⁾. Figure II-26 shows that as a result of these age-structural effects alone, the proportion of total mortality due to cancers, injuries and cardiovascular diseases will increase from 54% in 1980 to 59% in 2000 and 65% in 2020.

* A projection model was developed for this study by Beltrac⁽¹⁰⁾.

Scenario 2: The effects of changing risk and changing age structure:

Projecting the combined effects of changing age-specific, cause-specific death rates, and changing age composition is considerably more complicated, for it requires age-specific projections for particular causes of death, as well as for "other" causes (and therefore total mortality rates). In developing such scenarios, the principal assumptions are:

For cardiovascular diseases: As discussed in Chapter II4, death rates due to cardiovascular diseases in Brazil are high, but have been shown, both on the basis of national trends and detailed local studies, to be falling over the last 20 years. However, because of the delayed effects of the large increases in smoking in Brazil in recent decades, and because of the deleterious effects of changes in diet, it is assumed that this decline will be very gradual (as shown in Figure II-27) over the next 30 years.

For cancers: As shown in Figure II-27, age-adjusted cancer mortality rates have stayed relatively constant over the past 40 years in Brazil. As shown in Figures II-13 and II-14, the "cancers of wealth" (such as breast and lung cancers) are substantially higher in the more developed parts of Brazil, while the "cancers of poverty" (such as cervical and stomach cancers) are substantially higher in the less developed regions. Accordingly, over the next 30 years in Brazil the picture is likely to be mixed, with standardized mortality rates from some cancers rising while rates for other cancers fall. By far the most important factor leading to change in cancer rates will be the delayed effect on lung cancer of the large increases in smoking between 1950 and 1980. For the purposes of the illustrative scenarios, it is assumed that lung cancer rates in Brazil will reach current US crude levels (of about 30 deaths per 100,000 per year) by the year 2020. (It should be noted that these rates are substantially lower than independent predictions for Rio Grande do Sul for the year 2000⁽¹¹⁰⁾.) Mortality rates for other types of cancer will change much

more gradually, and some will increase while others decrease. For simplicity it is assumed that there will be no change from 1980 levels in the standardized death rate due to all other cancers.

Injuries: As shown on Figure II-27, death rates due to injuries (other than suicide and homicide) increased substantially between 1940 and 1970 and then declined somewhat between 1970 and 1980. These trends, again, are consistent with local trends (discussed in Chapter II-4). Homicides, however, have increased sharply in the major cities in recent years^(32,76). For the purposes of these illustrative projections it is assumed that in 2020 standardized mortality rates for homicide in Brazil as a whole will be 50% higher than the 1984 levels (which are still substantially below the 1984 levels for the major cities) and that the level of mortality due to "other injuries" (including traffic accidents) will remain at the 1980 levels.

"Other causes of death": Death rates due to causes other than cancers, cardiovascular diseases and injuries have fallen rapidly, due mainly to rapid declines in infectious and parasitic death rates. It is assumed that these declines will continue (Figure II-28).

To derive the "illustrative scenarios", these standardized mortality rates are applied to the age structure of the population in the years 2000 and 2020.

Question 1: How will the numbers of deaths per capita in the population from these causes change over time?

As a consequence of the changing age structure and the changing composition of causes of death, the crude death rates due to circulatory diseases, cancers and injuries will increase substantially between 1980 and 2020. As shown in Figure II-29, crude death rates over this period will increase: 140% for cancers; 71% for cardiovascular diseases, 68% for injuries, and 84% for all three causes.

Question 2: How will the relative importance of these diseases change over time?

Figure II-30 shows that the proportional mortality from cancers, cardiovascular diseases and injuries has risen steadily from 21% in 1940 to 54% in 1980, and is likely to rise to 74% by the year 2020.

Question 3: How will the number of deaths per working person change over time?

The rates per worker will also increase, although not as rapidly as the crude rates. For the three causes

of death together, the rate will rise by about 49% (Figure II-31).

These increases will primarily be attributable to large rises in the relative importance of cancer, especially lung and homicide. Although age-specific cardiovascular disease rates are assumed to decline over the period, as shown in Figure II-30, due to changes in age structure and reductions in other causes of death, the relative importance of cardiovascular diseases will continue to rise (from 32% of all deaths in 1980 to 41% of all deaths in 2020).

Question 4: How will the costs of medical treatment change?

Once again, it is necessary to make a series of simplifying assumptions. First, it is assumed that the number of cases of a particular disease that have to be treated is proportional to the number dying from that disease. And, second, it is assumed that the costs of treating a particular disease remain constant (in real terms) over the 40-year period. Under these simplifying assumptions, the model suggests that due to the changes in age composition and disease composition, the real costs of medical care per Brazilian will just about double in the 40-year period.

An obvious omission from these projections is AIDS. The omission is not intended to imply that AIDS is not likely to be a major cause of sickness, death and financial demand in the decades to come. On the contrary, as discussed in Chapter II-4, the trends are ominous, and it is quite conceivable that all other public health questions in Brazil could become secondary when compared to the problem of AIDS. AIDS is omitted from these projections because of the impossibility of making any plausible estimates of the role of the disease even in the medium-term future.

CHAPTER II-6:

THE POOR SUFFER MORE: RISKS, SICKNESS AND DEATH AMONG DIFFERENT SOCIOECONOMIC GROUPS

Should the problems of adult health and chronic diseases be accorded priority in a country where the diseases of underdevelopment, as manifested in infant mortality rates, are still very high? Or, to put it another way, why worry about the diseases of the rich of Sao Paulo instead of the diseases of the poor of the Northeast?

This chapter will show how these (legitimate) concerns do not correspond to reality in Brazil. Not only do the poor suffer disproportionately from the diseases of underdevelopment, they, not the rich, also suffer disproportionately from cardiovascular diseases, cancers, injuries and AIDS.

COMPARISONS BETWEEN COUNTRIES IN THE AMERICAS, AND STATE CAPITAL CITIES IN BRAZIL

Macro analyses of the relationship between death rates due to different diseases and the average income of populations were done for two samples: the first used PAHO data for the countries of the Americas between 1981 and 1984⁽¹¹³⁾; the second used Ministry of Health data for the 19 largest state capital cities of Brazil 1977⁽⁹⁸⁾. In both cases, World Bank estimates of the

average income levels of the countries⁽¹⁶⁴⁾ and states were used and death rates were adjusted for age structure. In the case of the Brazil data, rates were further adjusted to take into account the proportion of "deaths due to unknown causes". Then the adjusted death rates were regressed against per capita income. For many cause-specific death rates there was no discernible relationship to per capita income. For some (Table II-3) there was either a decisive or suggestive relationship to per capita income level.

Table II-3:

The direction and strength of relationship between mortality due to certain causes of death & per capita income in Brazil & the Americas

		STRENGTH OF RELATIONSHIP:	
		Decisive	Suggestive
DEATH RATES	Richer Populations:	Lung cancer, over 45 Colon cancer, all ages Breast cancer, all ages CVD, over 45 years Traffic deaths, per cap Suicide	Lung cancer, 35-44 CVD, 35-44
	Poorer Populations:	Stomach cancer, all ages Cervical cancer, all ages CVD, 15-24 Chronic obstructive lung disease Traffic death, per vehicle	Mental disorders CVD, 25-34 All injuries

Such comparisons between populations can only be suggestive, and may mask important differences at the individual level. Is there any evidence of similar differences at the individual or community level in Brazil?

COMPARISONS OF FAMILIES AND NEIGHBORHOODS

The relationship between class and disease may be assessed by examining how risk, disease and death vary by the proxies for class, namely, occupation, income and education.

Class and Risk

Several recent surveys show unequivocally that it is the poor who are most exposed to the classic, individual, chronic disease health risks.

In 1979 and 1980, a study in the industrial city of Volta Redonda (in the State of Rio de Janeiro) examined the relationship between education and hypertension⁽⁷⁸⁾. As shown in Figure II-32, the prevalence of high blood pressure among the more educated was much lower than among the less educated.

In 1987 a detailed assessment of the risk factors for cardiovascular diseases was conducted in Porto Alegre⁽⁴⁾. Among other things, it analyzed relationship between education and risk. As can be seen by Figure II-33, the uneducated are at substantially greater risk from hypertension, alcohol consumption, obesity, smoking and lack of exercise. If an individual with three or more risk factors is defined as a "high-risk" person, then 40% of uneducated women, but only 7% of women with post-secondary education, are at high risk.

A recent national survey by the National Division of Chronic and Degenerative Diseases of the Ministry of Health assessed the relationship of class to smoking, obesity and exercise⁽⁸⁷⁾. The prevalence of smoking was found to be similar in all income and education groups. However, only 21% of the poor (versus 36% of the middle class) wish to lose weight, and only about 25% of poor adults (versus 47% of the middle class) exercise regularly.

In addition to their high exposure to these "individual" risks, the poor are also generally more exposed to collective risks (environmental contamination and occupational hazards).

Class and Disease

There are few data available on the relationship between class and the incidence and prevalence of adult diseases in Brazil.

A major exception is a recent study of the elderly of Sao Paulo⁽¹²²⁾, in which it was found that the prevalence of chronic diseases and, more particularly, multiple chronic diseases, was substantially higher among the poor and the middle class than among the rich. The same study examined the relationship between both individual and neighborhood income and mental illness among the elderly, and showed that prevalence was much higher amongst poor individuals and individuals living in poor neighborhoods.

Initially in Brazil, AIDS was a disease of the privileged: between 1982 and 1985, 79% of those suffering from AIDS had completed post-secondary education. In the last four years the situation has changed dramatically, however, with the percentage cases among highly educated persons falling to 33%⁽²⁴⁾. A recent survey of high-risk groups showed that, while none (out of 67) upper- and middle-class prostitutes were infected with the AIDS virus, 9% of poor prostitutes were infected⁽⁸⁷⁾. AIDS, like most other diseases, is becoming a disease of the poor in Brazil.

Class and Mortality

Two recent, comprehensive studies have investigated the relationship between class and mortality in Brazil.

The first was an assessment of mortality rates by age and cause in rich and poor areas of Porto Alegre⁽¹⁰⁾ (Figure II-34). As expected, infant mortality rates were sharply higher in the poor areas. The study showed, too, that death rates were also substantially higher among the poor at all age groups studied (up to age 65). For example, overall death rates for men between the ages of 45 and 64 were 50% higher for the poor than the rich, and death rates due to cancers, cardiovascular diseases, respiratory diseases and injuries were all higher for men living in poor neighborhoods.

The second study involved a detailed review of 120,000 death certificates for adults 15-64 who died in the state of Sao Paulo between 1980 and 1982(127,151). The study showed (Figure II-35) that overall mortality rates and, specifically, mortality rates due to traffic accidents and homicide were far higher for blue collar workers than for professionals.

In summary, it is the poor in Brazil who face higher risks from the post-transition threats to health, who have the highest disease rates, and who die at the highest rates from these diseases. Strategies for prevention (discussed in the next chapter) must be based on these facts.

CHAPTER II-7:

PREVENTION: WHAT HAS BEEN DONE AND WHAT SHOULD BE DONE?*

From this perspective, Brazil is simply passing through the epidemiologic and demographic transition, and is just facing the problems of chronic and degenerative diseases that are part and parcel of progress and increased longevity in all industrialized countries. As should be clear from the analyses in the preceding chapters, however, Brazil also faces some unique and daunting challenges.

Building a more equitable and just society is the most important of these challenges. While this is indeed a task for the society as a whole and not just for the health sector, it nevertheless is the core health challenge. This is because it is the poor who are subjected to the greatest risks from: virtually all of the "diseases of the future" and also because some of the most pressing problems – such as the shockingly high rates of pedestrian deaths, murder, and deaths in the workplace – are manifestations of the "moral crisis" itself.

The enormity of this primary challenge does not mean that more concrete actions cannot or should not be undertaken, nor that these cannot be successful. Indeed, it is in part through the more limited and specific actions discussed below that Brazilians can work towards a more equitable and more healthy society.

As discussed in Chapter II-2, resources should be allocated to those preventive programs which are likely to have the greatest "benefit" (measured in terms of years of lives saved, deaths averted or increased quality-adjusted-life-years, QALYs) per unit of cost. And public resources should be used primarily for those programs (or components of programs) which are primarily public goods.

* Background papers on adult health were prepared for this study by Achutti, Duncan, Ruiz and Schmidt (8), and background papers on the elderly by Maia(9) and Ramos(121).

In considering any proposal for improving health, it is also useful to ask whether people will benefit without making any personal behavioral changes, or whether they will have to change their behavior. And, if they must make changes, how can they be induced to do so? Accordingly, there are at least four ways by which individuals may be protected:

- **Automatic Protection:** Without any change in personal behavior, the risk of sickness and death is reduced when air quality is improved, when pedestrian crossings are installed, when safety conditions are improved in a factory, and when product safety is improved;
- **Financial Inducements:** Individuals may decide to give up smoking or consume less alcohol if the government taxes these products more heavily, and people may drive more safely if insurance rates depend on driving records;
- **Legal Requirements:** Individuals may be more likely to use seatbelts, to drive only when sober, to wear a motorcycle helmet, and to refrain from smoking in public buildings if laws mandating such behavior are passed, if penalties are stiff and if the laws are enforced;
- **Information:** Individuals may decide to stop smoking, to change their diets and to exercise if they are provided with information on the health benefits of such actions.

Experience in industrialized countries indicates that programs operating through these different mechanisms have quite different effects on the middle class and the poor. In general, the poor respond relatively little to persuasion. It would appear that this is also true in Brazil. For example:

- A recent survey of attitudes towards changing health behavior showed that the poor were far more fatalistic than the middle class(87);
- The prevalence of smoking appears to have started to decline among the middle class but not among the poor(128);
- Many middle-class individuals have started to exercise regularly, but apparently the poor have not(84,87); and

- Poor prostitutes do not try to protect themselves from AIDS, despite a good understanding of the dangers they face⁽²⁰⁾.

In Brazil the "poor" is a very large group. In 1987, 49% of workers and 28% of families earned less than 2 minimum salaries (US\$ 200) per month⁽²¹⁾. As outlined in Chapter II-6, a great challenge for health in Brazil is reducing the risks and improving the health of the poor. A fundamental question that must be asked of any proposal for health promotion and disease prevention is: what effect it will have on the poor.

In this context, priority must be given to those improvements – such as better air quality, pedestrian crossings, and worker safety – that will improve the health of even the passive poor. It is also clear that successful health promotion activities among the poor will require ingenuity, innovation and experimentation if the costs per unit of impact are not to be very high. A key to this innovation must be involvement of organizations of the poor, such as unions, and community and religious associations.

Are there any experiences in Brazil that suggest that such actions can be undertaken and can make a difference? And are there failures from which lessons can be learned?

PREVENTION IN BRAZIL: SOME SUCCESSES AND FAILURES

In this section, some "successful" public health programs are discussed: the CETESB program for improving air quality in Sao Paulo; improvements in pedestrian safety in large cities; the success of unions, government and modern companies in reducing occupational injuries; and the cervical screening program in Sao Paulo.

The title "success" may seem ironic: Air quality in Sao Paulo is still frequently poor; occupational deaths and pedestrian deaths are several times those in industrialized countries; only 2% of adult women have had a Pap smear, and the about 60% of men and 30% of women still smoke! The programs described below are not touted as "successes" because they have solved the problems they address, but rather because they show how people, communities and government can be brought together to address very difficult

public health problems, and because they show that progress is possible.

A "success": Pollution control in Sao Paulo and Cubatao^(27-30,32,71)

In the 1950s and 1960s, there were massive increases in the concentration of humans, vehicles and industries in the Sao Paulo City – Santos area. As described in Chapter II-3, by the early 1970s the adverse effect of the high levels of air pollution on human health were becoming clear. The policy of "development first, environment later" was obviously reaching its limits in Sao Paulo.

The year 1976 was a landmark, with the passage of Sao Paulo State Law 997 establishing environmental standards and the regulatory mechanism for pollution control. By the late 1970s CETESB had adopted a strategy for improving air quality in the state. For the short- and medium-term, the strategy was to identify and to control the largest pollution sources by enforcing emission standards and by mandating use of the best available practical technology by industries and (although this is yet to be implemented) by new vehicles.

In Greater Sao Paulo, the source inventory showed that industries were responsible for about 60% of particulate emissions and (through power generation activities) 75% of sulphur dioxide emissions, while vehicles were the primary contributors to the high levels of carbon monoxide (85% of the total) and nitrous oxide (90%). In Cubatao, on the other hand, the contribution of vehicles was much smaller and industries represented most of the problem.

CETESB's control efforts have been remarkably successful. As shown in Figure II-36, there have been large reductions in sulphur dioxide, carbon monoxide and nitrous oxide levels in metro Sao Paulo. The same figure also shows that these cannot be accounted for by a decline in the number of vehicles or reduced industrial activity. CETESB data show further that in 1983 the levels of lead in the air were over 70% lower than in 1978. The introduction of alcohol as a vehicle fuel played a significant role in reducing lead emissions and carbon monoxide levels (alcohol engines produce 30% less carbon monoxide than gasoline engines). However, by 1986 only 35% of the light vehicle fleet

was powered by alcohol engines, so this evidently was not the only or even the principal factor. The substantial improvements were primarily a result of the effectiveness of the CETESB program in reducing emissions.

In Cubatao, an industrial city near the port of Santos, the results were even more impressive. As shown in Figure II-37, particulate standards were consistently exceeded by 20% or more in the early 1980s but by 1987 ambient levels were more than 90% below the standard levels.

At the same time, discharges of industrial wastewater effluents in metropolitan Sao Paulo were also being reduced substantially. In the early 1980s SABESP introduced an industrial effluent tariff, with industries paying according to the volume and biological and chemical quality (as measured by biochemical oxygen demand (BOD) and suspended solids (SS) concentrations) of the wastewater produced. The effects were dramatic, with reductions in volume, BOD and SS of over 40% in just two years⁽⁸⁸⁾.

These examples do not imply that Sao Paulo's very serious pollution problems are "solved". Rather, they indicate that with commitment of resources and personnel, it is possible to effect major improvements in Brazil's seemingly intractable urban environmental problems.

A "success": Occupational safety in Sao Paulo^(88, 107, 108)

Despite the fact that occupational injury rates in Brazil are still very high, there have been substantial improvements in industrial safety since the early 1970s. Progress has been most impressive in the modern, formal and large-scale industrial sector.

There are several reasons for these improvements. First, the very high injury rates in the early years of the "miracle" were probably in part due to the fact that most workers had no previous industrial experience. Even if nothing else happened, injury rates would probably have declined as workers learned to work in this new environment. Second, since 1974 every establishment employing 50 or more people has been obliged to have a Specialized Service of Occupational Safety and Health (SESMT) composed of occupational health physicians, nurses, and safety engineers who are

trained in specialized courses coordinated by the Ministry of Labor's Foundation of Occupational Safety and Health (Fundacentro). Over 15,000 safety professionals have been trained in this way. Third, in 1978 legislation to prevent occupational injuries and diseases was passed, although it, too, applied only to firms with more than 50 workers. Fourth and probably most important, independent trade unions were organized in the 1970s. The two major confederation of unions, with millions of members, are particularly well organized in Sao Paulo. Strict clauses regarding worker safety are now included in collective agreements, and the operation of the SESMTs is closely monitored by the unions.

Despite these improvements, death rates due to occupational injuries are still about 5 times higher in Brazil than in North America and Western Europe, and there is still no occupational safety and health program for about two thirds of the work force. Nevertheless, some progress has been made and considerably more progress is possible in industry and agriculture by strengthening the 3 primary elements – legislation, enforcement and union pressure – responsible for the improvements achieved so far.

A "success": Cervical cancer control in the city of Campinas and the state of Rio Grande do Sul^(89, 102, 172)

In the late 1960s, an experimental cervical cancer control program was initiated by the University of Campinas. Pap smears were taken from women attending municipal health centers and analyzed at the University Hospital. Those testing positive were referred to the University Hospital for treatment.

The program has grown continuously, with the number of pap smears increasing from 450 in 1968 to over 8,000 in 1985. The results of the program have been impressive. As shown in Figure II-38, the initially high level of serious cancers (Stage II or higher) was substantially reduced (from over 80% of all cervical cancers to less than 30%). The primary benefits of such a program are longer and healthier lives for women. But there are also substantial savings in the costs of treating cervical cancer. In Campinas it cost 9 times more to treat cervical cancer at an advanced stage than at an early stage.

There are some clear lessons from the Campinas experience. The limiting factor was not the capacity of the laboratory, but the organization and capacity of the outreach system. Even by 1985, despite considerable investments of resources and training, the cervical cancer program was operating satisfactorily in only 15 of 48 health posts in Campinas. In the words of the program staff, this program is a "very modest" beginning.

From the experience of cervical cancer programs in other countries, a problem with the Campinas program (and the state and national programs that draw heavily on the Campinas experiment) is its heavy reliance on existing medical care sites. As a result a substantial portion of the population may be missed, especially those at higher risk. It would appear that a concerted effort to deal with cervical cancer may not be successful if it is focussed uniquely, or even primarily, in the current health care system. A major outreach effort will be required.

In this light, another modest, but equally interesting, experience is the involvement of a non-governmental organization – the Women's League for the Combat of Cancer – in outreach efforts in Rio Grande do Sul. A joint program involving the State Secretariats of Health and Education, the Industrial Social Service (SESI), and the League has involved outreach to schools, factories and communities, and has made mobile clinics available for Pap smears.

These positive experiences provide some insights into how to address the cervical cancer problem in Brazil. Until recently, however, national efforts have been dismal. In 1983 only 7% of primary health centers offered cervical cancer screening, and fewer than 2% of Brazilian women had ever had pap smears. More recently, there have been improvements in some states and the initiation of a national effort as part of the National Campaign Against Cancer.

A "success": The national anti-smoking campaign^(2,38,130)

The first anti-smoking campaign in Brazil started in 1976 in Porto Alegre, through the initiative of local medical leaders with the support of local health and education authorities. In 1979 the Brazilian Medical Association adopted the program and gave it a national dimension. These efforts were further

boosted in 1984 by the initiation of the PAHO anti-smoking program. In 1985 the Ministry of Health appointed a group of scientists, government officials and public representatives to develop a national program to control smoking. With stimulation and support from the national level, a large number of local anti-smoking programs have been launched in recent years.

This campaign is generally considered to be well conceived, well managed and innovative, but the effects on smoking patterns are not known. Awareness of the dangers of cigarette smoking is, however, quite high. A recent national survey showed that 58% of adults considered smoking to be the most important risk factor for cardiovascular disease, and that 22% considered it to be the second most important cause.

As shown in Figure II-2, the prevalence of smoking has declined considerably in Brazil in the 1980s. Although the necessary longitudinal data are not available, it appears that declines have occurred in all socioeconomic groups, although for different reasons. For the poor it has probably been a matter of income, while the anti-smoking campaigns have probably also had an effect, along with income, on the middle class.

As with all other preventive activities in Brazil, the great challenge for the anti-smoking campaign is to devise innovative ways to affect the smoking habits of the poor. In addition, because smoking is increasingly common among young women, programs must specifically address women.

A failure to date: The hypertension control program^(88,138,139)

Most failures of prevention in Brazil are failures of omission. The control of hypertension, however, is one area where some efforts have been made, but with little success.

Hypertension control programs have been initiated in several states (including Minas Gerais, Rio de Janeiro and Ceara), and the Foundation for Public Health Services (FSESP), which operates primarily in less-developed regions, has started hypertension control programs in half of its medical care units. The performance of these programs is generally very poor. Two surveys in Porto Alegre (one in the late 1970s, one in the late 1980s) show that there

have been few improvements: ignorance of the condition, abandonment of treatment and poor control of blood pressure remain common.

It has been estimated that about US\$350 million is spent annually on hypertension control programs in Brazil, and that about 30% of hypertensives are detected through such programs. However, about 60% of those detected abandon treatment, and only about 30% of those treated have their blood pressure controlled. In other words, 4% of hypertensives have their blood pressure controlled at an annual cost of US\$350 million.

Since 1985 the National Division of Chronic and Degenerative Diseases of the Ministry of Health has initiated an integrated program for promotion of cardiovascular health that includes a program for hypertension control. Although still in the developmental stage, this program starts with a considerably broader approach. It correctly envisages the Federal Government as having responsibility for developing norms, undertaking the necessary monitoring and evaluation tasks, providing information to providers and the population at large, and stimulating state and local authorities to initiate cardiovascular health promotion activities.

WHAT SHOULD BE DONE?

As outlined in Chapter II-2, resources should be allocated to those interventions for which the cost-effectiveness is lowest. Table II-4 draws together the estimates (from Chapter II-3) of the likely costs and impacts of specific interventions.

Because of the variety of measures of effectiveness which are used in the literature, and because it is not possible to convert from one effectiveness measure to another, several cost-effectiveness measures are used in the table. In reading the table, no attempt should be made to read across the rows. Rather, by reading down the columns, the reader can get an impression of the relative cost-effectiveness of different interventions.

The data base for such comparisons is extremely precarious in any country of the world. In the particular case of Brazil, it is necessary to rely to a large degree on extrapolations from industrialized countries, an inherently dubious procedure given the large differences in the costs of, responses to, and effects of, different interventions in different

settings. Nevertheless, there are reasons for presenting such tenuous "data". First, because even with such imperfect data it is possible to identify some health interventions which are unequivocally "good buys" and some which are unequivocally "bad buys". Second, because the procedure encourages planners to give more consistent thought to the likely costs and benefits of different preventive actions. And third, because the framework indicates what types of information must be collected as part of an effort to rationalize the allocation of public health resources.

From Table II 4 it appears that, from the restricted list of interventions for which cost-effectiveness analyses are available, the unequivocal "good buys" include:

PRIMARY PREVENTION:

Traffic:

Motorcycle helmets.

Seat belts, but only if compliance is high.

Alcohol abuse:

Counselling and treatment

Anti-smoking:

A mass campaign

Individual counselling by physicians

Individual cessation clinics

Exercise:

Where the cost of exercise is not high and where the exercise is enjoyable.

SECONDARY PREVENTION:

Cervical cancer screening:

Where program is well organized, and where prevalence of cervical cancer is high.

Breast cancer:

Physical examination only.

TREATMENT

Hip replacement

Pacemaker implantation

Cancer treatment: cervix, breast, and possibly colon and rectal.

Coronary bypass: for left main artery only.

Similarly, from Table II-4, there is a group of unequivocal "bad buys". These include:

PRIMARY PREVENTION:

None

Table II-4: Order-of-magnitude estimates of the cost-effectiveness of some health interventions

INTERVENTION	SOURCE (Reference)	COST/ BENEFIT	COST/ QALY	COST/ YEAR LIFE GAINED	COST/ DEATH AVER- AGED	NOTE
(expressed as % of GNP/cap)						
PRIMARY PREVENTION						
Traffic:						
Motorcycle helmets	105	0.4				US: Costs of helmet:diverted medical care costs US: Costs: retail price increases & fuel costs
Seat Belts	150	0.4-3.0				
Smoking:						
Public information and personal smoking cessation services:	11			0.2-2	2-25	
Brief advice during routine medical visit:	42			4-10		
Counselling by physician:	42			30		
Alcohol Abuse	128	0.4				Oklahoma: Costs: Of reimbursing for services
Exercise	65		10-70	20-160		US: Range depends on how cost of exercise is treated.
SECONDARY PREVENTION						
Screening and control of:						
Hypertension						
Mild (90-94mm Hg):	42,65		370			
Mild (90-110mm Hg):				140		
Moderate (94-104 mm Hg):			140			
Moderate (>110 mm Hg):				70	70-300	
Cervical Cancer	11			5-25	70-300	C-e lower where prevalence high and program efficient
Breast cancer	11,104					
Physical exam by health worker				12		
Physical + mammography				100-400		
Hypercholesterolemia	42			400-600		Control with cholestyramine
TREATMENT						
Pacemaker implantation	47		12			
Hi:p replacement	47		12			
Cancer treatment:						
Cervix	11			10		
Breast				10		
Colon and rectum				40		
Lung				200		
Stomach				400		
Liver				540		
Coronary Bypass:	47					
for left main artery:			25			
with moderate angina:			210			
Kidney transplant	47		50			
Hemodialysis:						
home:	47		200			
hospital:			300			

Notes

1. The use of % of GNP per capita has been developed by Barnum and Greenberg (11). This, rather than monetary units, is used so that program costs are measured in roughly comparable units. As pointed out by Barnum and Greenberg, "the measure is deficient in that it primarily adjusts for labor cost differences between countries but does not account well for differences in foreign supply costs or in productivity. However, the deficiencies are offset by the convenience of the measure".
2. Cost-effectiveness ratios have been computed primarily for medical procedures. Relatively little information is available on primary prevention interventions.
3. The numbers in the table should be regarded as no more than indicative. In all cases some simplifying assumptions have been made; particularly in the case of the preventive interventions, there are large (and compounding) uncertainties (in costs, behavior and efficacy).
4. Virtually no studies give quantitative indications of the uncertainty of the estimates. In most cases the uncertainty is very large. Where ranges (such as 100-400) are given, this does not imply that this is an estimate of uncertainty, but only that this is the range of point estimates made by different analysts.
5. The studies use similar, but not identical methods of analysis. Generally costs are net health costs; however, discount rates and preference rates are not completely consistent.
6. Accordingly, the table can be used only to derive an order-of-magnitude "feel" for the relative cost-effectiveness of different interventions.
7. The table is not exhaustive. Potential interventions are not excluded because they are not cost-effective, but because there is no information available on them.

SECONDARY PREVENTION:

Hypertension control:

Except possibly for a well-run mass program, with high compliance and for high blood pressure.

Breast cancer: screening with mammography

Cholesterol control: through cholestyramine

Cancer treatment:

Lung, stomach and liver.

Coronary bypass with moderate angina.

Hemodialysis.

As is apparent from the dates of the references in Table II-4, this is a relatively new area of investigation, in which substantial conceptual and empirical progress is being made in industrialized countries. Within a few years it should be possible to draw up an expanded and greatly improved version of Table II-4. An important task in Brazil is the initiation of applied research aimed at collecting more appropriate and reliable data on both costs and benefits of health interventions.

From Table II-4, from the earlier discussions on the relationship between poverty and health, from the examination of some interventions (successful and unsuccessful) in Brazil, and from a review of the experience in industrialized countries, some important principles emerge for a preventive health program in a post-transition Brazil:

- Highest priority should be given to reducing risks in ways that do not depend on individual discretion (such as protecting pedestrians more effectively from cars, improving safety in the workplace and improving air quality); whence the focus should be on populations, not individuals;
- Primary focus should be on risk factors (including smoking, poor diet, consumption of alcohol and drugs, and lack of exercise), not on medical conditions; whence interventions outside of the medical care system will often be most important;
- Programs must be directed primarily to the poor and must take explicit account of their situation; whence organizations that include the poor (including unions and religious and community organizations) must be given a major role.

How should such preventive services be financed? The principle (as described in Chapter II-2) is that public resources should be spent primarily on public goods, with private goods financed primarily

through private spending. In Chapter III-3 the implications of this principle for health financing in Brazil are discussed further.

In recent years the National Division of Chronic and Degenerative Diseases and some state governments have initiated chronic disease prevention programs. These efforts are important and should be strongly supported. However, they have also been limited in scope and have focused primarily on providing preventive services through the health delivery system. Relatively little attention has been given to health promotion and protection activities, let alone to critical actions in other sectors (such as education, transport, occupational safety and criminal justice).

Critical to chronic disease control is the development of a preventive mentality, the building of a constituency and the institutionalization of the process. The formulation of a modest but realistic set of programs plays an important role in this process. The National Division of Chronic and Degenerative Diseases and some state Secretariats of Health have taken just this approach.

These efforts represent major advances and should be fully supported. There are, however, three principal limitations to the present strategy. First, the actions by the health sector do not take adequate account of the fact that the problem of prevention of the new health problems is principally a problem of prevention among the poor which will require much more innovation and experimentation. Second, sufficient attention has not been paid to the likely costs and benefits of different interventions. And, third, the definition of prevention as primarily a matter for the health sector is too limited. Critical national needs include:

- a comprehensive and coherent program for reduction of death and disability attributable to non-intentional vehicular and occupational injury and violence; and
- major improvements in the capacity for environmental analysis, monitoring and regulation in states other than Sao Paulo.

The fact that these actions go beyond "the health sector" (to involve federal and state legislatures and executives, the criminal justice system, industry, labor unions and community groups) does not mean that they are infeasible. Indeed, the review of "successful" interventions suggested that it was precisely such multi-sectoral actions outside of the

health sector that have been relatively successful in Brazil.

This perspective implies major changes in government action. Strong public sector institutions at the federal and state levels that deal with issues such as health promotion, occupational health, product safety, environmental protection, food and drug safety, highway safety and public safety should be greatly strengthened. In some cases, allocation of health sector resources to such ends will be justified.

Unfortunately, it is probably not appropriate to extrapolate from the experience of industrialized or other countries in devising preventive programs, especially those designed to reach the poor. Accordingly, the government (federal, state and local) in Brazil cannot deal with this new reality successfully without developing flexible and innovative institutions capable of collecting and analyzing data, initiating interventions based on these data, monitoring the interventions and modifying the interventions as a result of the findings.

Finally, it is painfully apparent that a scientific approach to prevention requires more comprehensive and higher-quality information than is currently available. Numbers are critical to defining the problem, garnering political support and attempting evaluation. Accordingly, it is necessary to begin to develop a hierarchical, decentralized epidemiologic information system that will serve the needs at the national, state and local levels.

THE POTENTIAL EFFECTS OF SUCCESSFUL PREVENTION

The problem of preventing the post-transition health problems is a formidable one, involving changes in deep-seated individual and institutional behavior and culture. Even under the best of circumstances, furthermore, there are significant limits to the power of chronic disease programs. There is nothing on the horizon for chronic diseases that has the potential impact of immunization, swamp drainage or the pasteurization of milk. The interventions are "weak" in comparison; thus, a smaller proportion of the population will probably be affected, and the effect may be smaller than the effect of some traditional public health tools. For example, the Centers for Disease Control in the United States has

calculated that elimination of smoking, hypercholesterolemia and hypertension in the US would prevent only about one quarter of the CVD diseases that would occur in the absence of such interventions. If other personal risk factors (stress, obesity and exercise) were controlled, 30% of CVDs might be prevented*. Furthermore, there are long "latency periods" before the effects of such improvements become apparent.

The one great exception relates to reductions in the extremely high death rates due to injuries. While Brazil's rates of other post-transition diseases are "normal", injury rates are unusually high. It appears that the payoffs to an aggressive effort to reduce traffic and occupational hazards would be large. And it appears that modern and innovative approaches to crime prevention could have a significant impact on intentional injuries⁽¹²⁵⁾.

What might be the impact of dramatically effective prevention programs in Brazil? Using the simple scenario developed in Chapter II-5 as a starting point, it is assumed that prevention could:

- cause age-standardized cardiovascular death rates to fall by 20% (instead of the 10% previously assumed);
- cause age-standardized cancer rates to rise by just 20% (instead of 40%); and
- cause injury rates to stay at the 1985 national levels (instead of rising, by 50%, to the 1985 Sao Paulo).

Using the same simple projection "model", it can be shown that if a prevention program achieved such results, there would be about 15% fewer deaths due to cancers, cardiovascular diseases and injuries in 2020 than would otherwise be expected. Moreover, the costs of medical care for each Brazilian would be about 75% higher than in 1980, rather than 100% higher (as would be the case under the original assumptions).

* R. Rothenberg, CDC, Atlanta, Personal communication.

Part III: FINANCING: What are the problems and what can be done?

SUMMARY

In recent decades there have been large increases in public spending for health in Brazil, but there are serious problems with the ways in which these resources have been spent. Resources have been poorly allocated: Little is spent on prevention and much on curative care (about 70% of all spending is on hospitals alone); little is spent on the poor, and much on the middle class. Resources have been used inefficiently, both by the so-called "private sector" that has provided most publicly financed services, and by the public sector. In managing the use of public resources there has been heavy reliance on norms and regulations, and relatively little use of incentives.

Spending on certain disease prevention and health promotion activities appears to be highly cost-effective. It is estimated only about 3% of the public resources spent on health would be required for an intensive program to prevent adult ill-health.

Under reasonable assumptions of economic growth, it is conceivable that per capita income will double over the next 30 years. Since the proportion of national income spent on health care rises with the level of per capita income, it is possible that, in 2020, society will be willing to spend more than double the amount currently spent on health. For several reasons, however, it would appear that in coming decades increases in demand for health care will outstrip this increased willingness to pay. First, by the year 2020, the joint effect of the demographic and epidemiologic changes will double the per capita costs of providing the current quality of medical treatment to the currently served proportion of the population. Second, as mandated in the Constitution, the entire population – not just the population covered by the social security system – is to be covered by the publicly financed health care system. And third, as in all industrialized countries, there will be heavy pressures for use of high-technology, expensive medical care.

Accordingly, financing the Brazilian health system will present a formidable challenge and will require ingenuity, flexibility and innovation. A creative response to financing of health services in the next decades might include:

- decentralizing control to the state and local level, and reducing political control of the process whereby resources are transferred from the federal to the state level and from the state to the municipal level;
- allocating more resources to health prevention and promotion activities, and providing more and better services to the poor;
- mobilizing private resources by requiring the middle class to pay for some of their health care;
- rationing medical care on the basis of need and cost-effectiveness;
- using incentives and modern management techniques so that both the private and public sectors may be used to maximize the outputs produced by the health system.

CHAPTER III-1: DEMAND: THE IMPACT OF EPIDEMIOLOGICAL, TECHNOLOGICAL AND POLITICAL CHANGES

The demand for health services is paradoxical. Logically, there would appear to be less need to spend money on health care as societies develop and people live longer and healthier lives. In fact, however, an examination of the relationship between individual and societal income and the demand for health services shows just the opposite. Health care is a "luxury good": at higher levels of income individuals and societies (as shown in Figure III-1) choose to spend higher proportions of income on health services. This chapter examines some of the reasons why this happens, and suggests how the proximate demographic, technological and political causes of increased demand are likely to change in Brazil in the coming decades.

An aging population

In the past several decades, there have been extraordinary declines in fertility and infant and young child mortality in Brazil. As these changes work their way through the population, as shown in Table III-1, it will rapidly change from a "young" population to an "old" one. The number of elderly will increase from 7 million in 1980 to 14 million in 2000.

Table III-1:
Changes in the age composition of the population

	1980	2020
% under 15 years old	38%	26%
% between 15 and 59 years old	56%	62%
% over 60 years old	6%	12%
Elderly dependency ratio: (# elderly/# in working ages)	11%	20%

Source: Ramos (123)

These demographic changes have fundamental implications for the demand for medical care. Chronic and degenerative diseases occur with

greater frequency among the elderly, and there will therefore be increases in the demand for treatment of these expensive-to-treat diseases. In industrialized countries, per capita health care expenditures on people over 60 are almost 4 times the per capita expenditures on the rest of the population⁽¹²⁴⁾. With respect to supply, the burden of generating the resources required for the provision of public health services will fall on the working-age population which will decline slightly as a proportion of the population over the next several decades (Table III-1).

Improved screening programs

As outlined in Part II, an important category of prevention involves screening healthy people to identify risk factors. Screening programs for the control of hypertension and cervical cancer are being promoted at both national and state levels in Brazil. In industrialized countries, health planners have long justified such programs in financial terms, arguing, for instance, that it is cheaper to treat a case of hypertension than to treat stroke victims.

Recent, more complete and sophisticated analyses of the full costs of such screening programs have shown that such programs, in fact, often lead to net increases in costs to the health care system⁽¹²⁵⁾. This does not imply that such programs are not justified investments, but that they are justified because they improve health, not because they can help resolve the problem of rising health care costs. In terms of the present discussion, the key issue is that, as screening programs become established, more people and facilities are needed to screen and to provide follow-up, and more drugs and other therapeutic supplies are needed to treat those at high risk. Better screening programs, therefore, will increase the demand for health services.

Increases in disability

Chapter II-5 showed that the burden of chronic and degenerative diseases in the population will increase considerably over the next 30 years. The proportion of total deaths due to cardiovascular diseases, cancers and injuries will increase from 54% in 1980 to an estimated 74% in 2020.

While the mortality profile can be projected with some confidence, and while these projections provide a sense of how health care needs will change over time, it does not provide a complete description of future needs. This is because, in some extreme sense, health care costs are not incurred because people die but because they live!

A useful way of thinking about this issue, developed by the World Health Organization⁽¹⁷⁰⁾, is illustrated in Figure III-2, in which the total years of life lived by a population are divided into "healthy years" and "sick or disabled years". As life expectancy increases, of course, the total number of years lived per person in the population increases. From the perspective of the demand for health services, a key question is whether this increase in total years is accompanied by an increase (or decrease) in years of sickness and disability.

This subject is currently being studied in industrialized countries^(137,154). From a theoretical perspective, there are competing theories, none of which is currently considered hegemonic. At the moment, there are only two empirical studies, one from Canada⁽¹⁵⁵⁾ and one from the United States⁽⁴¹⁾, that address this issue. These studies show that life expectancy increased by an average of 3.2% per decade in Canada between 1951 and 1978, and by about 4.3% between 1970 and 1980 in the US. When decomposed into "healthy" and "disabled" life years, however, it was found that, in both cases, the gains in "healthy life" accounted for less than one third of the total gain, with "disabled years" accounting for 78% and 68%, respectively, of the increases in life expectancy in Canada and the US. As Figure III-3 illustrates, for these populations this implies:

- a small increase (less than 2% per decade) in "healthy life";
- a modest increase (less than 5% per decade) in "total years of life"; and
- a very large increase (over 20% per decade) in "disabled years of life".

The implications of these findings are profound: they suggest that relatively small increases in life expectancy are "bought" at the cost of very large increases in sickness and disability. Since it is the latter that underlie the demand for health services, these structural changes lead to large increases in the demand for health care.

As illustrated in Figure III-4, the same theoretical model also provides a useful framework for considering how different interventions might affect "healthy" and "disabled" years of life. If the only intervention is treatment after a person became sick ("a" on Figure III-4), then the intervention might be expected to have little effect on the "sickness curve", but to instead to displace the "mortality curve" to the right. In an extreme case this would mean that the effect of the intervention would be to stimulate large increases in the years of sickness in the population.

If, on the other hand, the intervention were to prevent the onset of sickness, but do little to prolong life once the person was sick, then the effect would be to shift both the sickness and mortality curves to the right. A preventive intervention of this sort ("b" on Figure III-4) would effect little change in the years of sickness in the population.

This analysis has two implications. First, the empirical results from the Canadian and US data suggest that life expectancy gains have come primarily because, through improved case management, sick individuals are kept alive longer than was previously possible. Since these systems invest very heavily in case management – in the US, for instance, 95% of the health care budget is spent on treatment of the sick – the large increases in disabled life are to be expected. Second, the model suggests that preventive actions that extend life will result in smaller increases in the demand for health care than a treatment action that extended life by the same amount.

What does this mean for Brazil? First, because the Brazilian health system places as heavy emphasis on treatment as the Canadian and US systems, the same explosive increases in disability will probably occur in Brazil. Second, investments in life-extending treatment initiate a vicious cycle in which the initial costs are high and the effect is a more sickly population that demands more intensive inputs of treatment, and so forth.

Increases in costly diseases

Cardiovascular diseases, cancers and injuries currently account for about half of the sick who are admitted to hospitals in Brazil. As the old diseases of underdevelopment become less common, these new causes of death will become an increasingly dominant cause of demand for health services. Because cardiovascular diseases and, particularly, cancers are generally more costly to treat (see Figure III-5), this shift will mean a substantial increase in the cost of medical care.

Universal access to services and increased consciousness of rights

As described in Part I, a two-tiered system of publicly financed health care has developed in Brazil over the past two decades. The reality is that the "lower track" – that is, services supplied by different levels of government to those not working in the formal sector – has, for the most part, involved little health care. The highly unequal regional distribution of health services reflects this situation: the per capita levels of hospital and outpatient facilities are much higher in the South and Southeast than they are in the rest of the country (Figure III-6).

This dual system is now officially a relic of the past. The Constitution of 1988 establishes universal access to publicly financed health services as a constitutional right. Implementation of this right would have a significant effect on the demand for, and costs of, publicly financed medical services. If the levels of inpatient and outpatient use were the same in the rest of the country as they are for the 60% of the population that lives in the South and Southeast regions, the number of hospitalizations would be about 13% higher and the number of outpatient visits, about 25% higher. (The increase would, of course, be substantially greater if account were also taken of the underserved living in the urban periphery in the South and Southeast.)

CHAPTER III-2:

SUPPLY: HOW IS HEALTH CARE FINANCED AND PROVIDED?*

The evolution of the system for financing and providing health care in Brazil, and its relation to overall development policies and performance, have been described in Part I. This chapter describes in more detail how health services in Brazil are financed and provided.

In a general sense, there is no such thing as "the Brazilian health system". Rather, as represented schematically in Figure III-7, there is a patchwork of financing and provider arrangements that has changed considerably in recent decades and that continues to be in flux.

WHO PAYS FOR HEALTH CARE?

Public spending

It is estimated that Brazil spends 5% to 6% of GDP on health care, about equally divided between public and private sources. The social security budget provides, through INAMPS, about half of all public financing for health, and about three quarters of all federal government spending. The INAMPS budget is highly dependent on employment and wage levels, and thus grows rapidly in times of economic prosperity (13% a year during the 1970s⁽²¹⁾) and contracts during recessions.

Health services are also supported by the general budget through the Ministry of Health. These expenditures have primarily been for low-quality, basic health services for the rural and urban poor, and for a variety of disease control programs. State and local governments account, respectively, for about 17% and 10% of all public spending on health in 1986⁽²²⁾.

* Background papers on the financing of health services in Brazil were prepared by Cordeiro⁽²⁴⁾, Correia de Campos⁽²⁵⁾ and Medici⁽²²⁾.

Private spending: the "old" forms

Health care is also financed privately, by both companies and individuals. The most recent survey data on private, out-of-pocket expenditures on health are from the PNAD (National Household Sample Survey of IBGE) of 1981⁽²⁷⁾. These data, shown on Figure III-8, indicate that:

- the rich spend much more than the poor on health care;
- the poor spend much greater proportions of their income on health care than the rich (about 5% versus 2%);
- the rich purchase primarily the services of physicians, while the poor purchase mostly unprescribed medicines.

Private spending: group health plans

In addition to the "old" form of true private sector activity (in which individuals pay a physician for services rendered), there is a more complex form of privately financed health care that has become very important in Brazil in the 1980s^(22,152). This sector is variously known as the "supplementary sector", the "group health sector", the "private health insurance sector" or the "health maintenance organization sector".

In the 1980s, privately financed, privately provided group medical plans have assumed major importance. The number of people covered by such plans has grown dramatically. Group health plans currently serve an estimated 20 million people, with coverage being high in industrial centers in general and in Sao Paulo in particular. This heterogeneous sector comprises several hundred firms, which are financed and managed in a variety of ways, and which provide widely differing services to their members. The four main forms of private plans are:

- "group medicine plans", in which a monthly capitation fee is paid to a profit-making company (such as Golden Cross) and in which

the company itself provides services;

- "medical cooperatives", in which a monthly capitation fee is paid to a physicians' cooperative (such as UNIMED) and in which the physicians who are members of the cooperative provide services;
- "autoprograms", in which companies contract with a health services company to provide services for employees on a fee-for-service basis;
- "health insurance programs", in which those covered seek care from any provider and are then reimbursed for costs.

As Figure III-9 shows, the two dominant forms (accounting for about 85% of the market in this sector) operate on the basis of capitation fees paid by subscribers who can then use the physicians of the medical companies (as in the case of Golden Cross) or "preferred providers" (as in the case of UNIMED). Because payment is on a per capita basis, these are considered "health maintenance organizations" (HMOs).

Although individual families can and do purchase HMO coverage, the dominant financing mode is that a company has a contract with an HMO, with the monthly costs for each worker and his or her family paid partially by the company and partially by the worker. In the past, companies participating in such schemes were able to withhold a portion of their social security contributions. By and large they are no longer permitted to do so, but the change has apparently not affected the growth of this sector.

HMOs are both financing systems and providers of health care. Their structure and possible role as providers of publicly financed services is discussed in more detail below.

WHO PROVIDES HEALTH CARE?

Publicly financed health services

From 1968 until the mid-1980s, INAMPS used the privately contracted network of hospitals and physicians as the principal mechanism for providing health care to formal sector workers. In 1981 61% of all INAMPS spending went to the network, 20% was for INAMPS's own services, 4% went to non-profit private sector providers (the so-called "philanthropics") and 2.5% to university hospitals⁽³⁸⁾.

For the economic and political reasons described in Part I, there was a major change in INAMPS' policy in the mid-1980s. One aspect of this change was a reversal in the role of "preferred INAMPS provider". A set of measures (described in more detail in Chapter III-4) were taken to reduce the role of the private contractors and to increase the role of public providers (both INAMPS's own hospitals and university, state and municipal hospitals)⁽³⁹⁾. Figure III-10 shows how INAMPS spending on the private network has declined in the 1980s and how spending on the public hospitals has increased. Not all the consequences of these changes have been positive. As the network has decreased in importance, the demands on sophisticated public hospitals for basic care have increased. Between 1985 and 1987, patient loads of the university hospitals increased by 13%. In addition, the changes in the payment system (from fee-for-service to fee-per-procedure) have given the for-profit system an incentive to pass through more difficult and expensive-to-treat cases to the more complex hospitals (often the university hospitals).

Group health plans: Their rise and their role^(42,152)

The HMOs are worthy of a more detailed analysis than the other components of the "health system", for two reasons. First, there is extensive documentation of the publicly financed health sector in Brazil, but relatively little information on the group health plans. Second, this is a dynamic, modern sector that could play a key role in the overall process of modernizing the financing and delivery of health care in Brazil in the 1990s.

The dramatic growth in this sub-sector has coincided with the stabilization in INAMPS budgets in the 1980s, and with the contraction of the INAMPS-funded private network. Although definitive analysis remains to be done, it would appear (and is so claimed by the HMOs) that the rise of HMOs is a result of employer and worker dissatisfaction with the quality of INAMPS-funded services.

It is commonly asserted that the middle and upper-middle classes are the primary subscribers to HMOs. This may be the case with those who subscribe individually, but, given the depth of penetration of the HMOs in areas such as Sao Paulo, it is obvious that the base is broader than

this. Indeed, a recent survey of HMO users found that users were distributed more or less evenly by income group. For example, 29% of HMO users earn more than 2 minimum salaries⁽¹⁵²⁾, whereas about 28% of working age people in the Southeastern Region earn more than 2 minimum salaries⁽⁶⁹⁾.

The group health plans offer a wide variety of options and plans, with differing levels of coverage. For the most part, the plans cover primarily routine, relatively low-unit-cost procedures. High-cost procedures are generally not covered, and subscribers needing these services are "dumped" into the publicly financed system. In part because of this practice, and surely in part because of relatively high efficiency in such plans, per capita costs are not excessive (typically about US\$100 per year). This is about twice the national average per capita public spending on health, and probably little above average per capita public spending on health in the South and Southeastern regions.

A recent survey of HMO users indicates that there are serious problems with the quality of services offered by some HMOs. As shown in Figure III-11, dissatisfaction is particularly high with the dominant "group medicine" category of plans. Almost half of all subscribers to such plans consider the service to be of low quality and even more think the waiting lines are too long, while nearly one third consider the services to be too restrictive. Probably in part because of such problems, the market share of the "group medicine" companies has declined rapidly relative to their major competitor, the "medical cooperatives". In the mid-1980s, the major "group medicine" company (Golden Cross) commanded 95% of the group health plan market; today its share is 60%. The quality of the medical cooperative programs is perceived to be much higher than that of the group medicine plans (although there are still widespread concerns about waiting times and restrictions).

A recurring theme throughout this paper is the necessity for modernizing the health sector in Brazil, for improving efficiency so that limited resources may be used to maximum effect. In this context, a key question (discussed further in Chapter III-4) is whether the HMOs are efficient suppliers of health care.

TOWARDS THE 1990s

In 1987 a Presidential Decree established the SUDS, the "unified and decentralized health system". While the unification was widely welcomed at the state and municipal levels, there has been relatively little progress in implementing the SUDS because of: resistance from vested interests (most particularly the network of contractors and the INAMPS bureaucracy itself); the weakness of the state health sector itself; and irregular transfers from INAMPS to the states.

Although this process is now mandated by the new Constitution, it will be some time before a unified and decentralized system is functioning. Political resistance aside, the envisaged transformation is immense, the context one of fiscal, administrative and political uncertainty, and the flexibility and capacity of antiquated and inefficient federal and state health bureaucracies limited.

CHAPTER III-3.

MAKING BETTER USE OF PUBLIC HEALTH RESOURCES*

WHAT TYPE OF MEDICAL CARE IS PROVIDED?

Too much hospital-based care

The publicly financed medical care system in Brazil is extraordinarily top-heavy. Hospital costs have increased from less than 40% of total public health costs in the 1960s to nearly 70% in the 1980s⁽³⁸⁾. Although there has been considerable expansion of basic outpatient services in the late 1980s⁽³⁴⁾, this has had little effect on the overall structure of spending. As shown in Figure III-12, the Brazilian health system is considerably more "hospitalcentric" than the systems of industrialized countries, and even more unbalanced when compared with relatively poor European countries (such as Portugal).

Medium and large hospitals play a dominant role. For the INAMPS network, about 43% of hospitalizations and 53% of expenses are in the 17% (about 620) of hospitals with more than 150 beds. If the other major components of the publicly financed system (INAMPS's own facilities, university hospitals and non-profit providers) were included, the concentration in large hospitals would be even more extreme.

This concentration on hospitals is partly a result of INAMPS' extensive use of private contractors in the 1970s, and of fiscal incentives for the construction of private hospitals in the "miracle" years. As shown in Figure III-13, the private sector dominates provision of tertiary care, while the public sector is responsible for virtually all primary health care facilities.

The average availability of hospital beds in Brazil (4.1 per 1000 population) is about 33% higher than would be predicted for a country of Brazil's GNP per capita (see Figure III-14). Although access is by no

means universal, even when the whole population is used as the denominator, publicly financed hospitalizations are excessive in the South, Southeast and Center-West regions.

In the mid-1980s, INAMPS introduced a series of reforms (discussed further in Chapter III-4), including the termination of the fee-for-service system, aimed at curbing abuses in the contracted network and at providing additional resources to public hospitals. As a result, private contractors no longer consider payment for treatment of complicated diseases to be adequate. Thus, as shown in Figure III-15, the contracted hospitals concentrate heavily on relatively simple diseases and procedures, while most of the more complicated and expensive diseases (especially cardiovascular diseases and cancers) are treated primarily in public facilities.

The treatment of individuals with mental health problems provides a good illustration of the problem of excessive hospitalization^(43,45). Although hospital admissions for mental diseases account for only about 3% of all hospital admissions, the average length of stay is long (nearly 70 days) and mental conditions account for over 12% of all hospitalization costs. In the early 1970s, mental hospitals were predominantly public. During the 1970s, the number of private mental beds increased four-fold. By 1980 the network provided two thirds of all mental hospital beds. Concurrently, many more people were admitted to hospital as mental patients: Per capita hospitalizations in the early 1980s were double the level a decade earlier. This practice is not only expensive, but also contradicts modern mental health practice, which emphasizes community-based treatment for most of the mentally ill. (In Italy, per capita hospitalizations for mental problems have fallen by 50% since reform of the mental health system in the mid-1960s. As in other countries which have deinstitutionalized mental care, this process has not been without formidable new problems⁽¹⁸⁾.)

* Background papers addressing the allocation of health resources were prepared by Cordeliro⁽³⁴⁾ and Correia de Campos⁽³⁸⁾.

Outpatient care is too specialized

The composition of outpatient facilities is also top-heavy. There is a heavy concentration in specialized units and a relative dearth of general, outpatient facilities.

As in the case of hospital care, there was a marked shift in INAMPS in the mid-1980s away from private contractors. The proportion of outpatient services provided by private contractors fell from 66% to 57% between 1985 and 1987.

Rapidly growing use of high-tech procedures

Throughout the industrialized world, there have been rapid advances in medical technology over the past several decades. More specifically, the array and complexity of technology available for keeping sick people alive has increased dramatically. Brazil is part of the international community in this regard, and new medical technologies from the industrialized world have been incorporated rapidly⁽¹⁶³⁾.

Time series data on the use and costs of high-tech medical technology in Brazil are not available. The levels, however, are currently quite high. In 1988, for instance, INAMPS paid over US\$ 100 million (3% of the total INAMPS budget) for just 4 high-tech outpatient treatment procedures (hemodialysis, hemodynamic studies, endoscopy and computerized tomography)⁽²⁴⁾.

Chapter III-4 describes some initial steps that have been taken in Brazil to address the problem of technology assessment, choice and control, and discusses how this vital capacity may be developed in the future. Under any set of circumstances, however, there is no doubt that the demand for high-tech, expensive medical technology will continue to be a central factor in increasing health care costs in Brazil.

EQUITY: WHO BENEFITS FROM PUBLIC SPENDING ON HEALTH?

Not the poor regions

As noted earlier (Figure III-6), regional disparities in the availability of hospitals and outpatient facilities are great, with per capita levels 2 to 4 times higher

in the South and Southeast than in the North and Northeast. Even within the well-supplied regions, moreover, the availability of services is uneven, with a dearth of basic facilities in many of the peripheral areas of the cities of the South and Southeast.

Not the poor people

Data from around the world have consistently shown that the demand for health services is highly income elastic⁽¹⁶⁰⁾. That is as income rises, absolute spending on health care rises at an even faster rate. However, as shown by Figure III-8, in Brazil in the early 1980s⁽⁶⁷⁾, the proportion of income spent on health services was much less for the rich than for the poor. The explanation for this apparent contradiction is that the middle class and the rich, not the poor, were the principal beneficiaries of publicly financed health services in Brazil.

The regressive nature of subsidies from publicly financed health care is evident in the regional distribution of facilities (Figure III-6), too. The provision of publicly financed services heavily favors the more developed regions of the country.

RESOURCE MOBILIZATION: WHAT IS SPENT AND WHERE DOES IT COME FROM?

Is spending on health adequate?

Over the past two decades, public spending on health has increased at an annual average rate of about 10%⁽²¹⁾. It is estimated that between 5% and 6% of GDP is currently spent on health, with about half of this public spending⁽²⁶⁾. Many health professionals in Brazil believe that this level is far too low, and frequently cite the substantially higher percentages of GDP spent on health in industrialized countries. The Eighth National Conference on Health, for instance, concluded that the short-term goal should be for Brazil to spend 10% of GDP on health.

However, health is, in the jargon of economists, a "luxury good", since societies are willing to spend higher proportions of income on health as national per capita income increases. From this perspective, does Brazil spend "unusually little" when compared to other countries? The answer, as shown in Figure III-16, is clearly no. If anything, Brazil appears to already spend a somewhat higher proportion of

GDP on both public and total health care than would be expected for a country of Brazil's level of per capita income.

Is spending likely to increase?

There are two main factors that will tend to increase health spending in Brazil over the course of the 1990s: rising income and redistribution of benefits. First, because the proportion of GDP spent on health increases as per capita income rises⁽¹⁰⁰⁾, an increase in per capita income of, say, 10% over the next decade would mean a slightly higher increase in real per capita expenditure on health. Second, if the incidence of benefits of public spending on health are indeed redistributed towards the poor, it is likely that the middle class and the rich will increase their private spending on health.

On the other hand, there are strong forces that will tend to reduce public spending on health. First, it seems likely (although the complementary law for the new Constitution is yet to be written) that the core of public health financing will continue to be the funds that remain in the social security fund after retirement and welfare benefits are withdrawn. Because the new Constitution mandates large increases in retirement benefits, social security spending on health is likely to drop drastically. Second, there will be pressures to reduce public spending on health (and all other sectors) in the face of a prolonged period of fiscal austerity.

On balance, modest increases in public and overall health spending might be predicted by the year 2000, but in the short run, the health sector will do well if it manages to maintain current public sector spending.

Can non-governmental resources be mobilized?

Given the modest, at best, prospects for increasing public spending, is it possible to increase private spending on health? The answer appears to be "yes". Finding ways of translating this potential into reality is one of the major health policy tasks in the years ahead.

What are the criteria that should govern this mobilization of private resources? First and foremost, the health sector in Brazil must provide better services to the poor, who already pay a high proportion of income (about 6%) on health care.

The bottom line must be that more public resources be directed to the poor and that the poor should pay less, not more, for health care. Second, the middle class and the rich must be persuaded to use fewer public resources and to spend more of their private resources on their own health care. How this may be achieved through both the private and public systems is discussed in more detail below. Third, the ideal financing system cannot fully target public resources to the poor. If the middle classes and the rich were to get no benefits from public spending on health, sooner or later political pressure would build to reduce public spending on health.

Accordingly, the task would appear to be to design a system in which:

- the poor receive free publicly financed health care of reasonable quality;
- the middle class and the rich pay directly for a substantial portion of their health needs, but still get some benefits from the publicly financed system.

Extension of services to the under-served is perceived to be the major objective of public health reform in Brazil. However, this reform will be vitiated by financing realities unless progress can simultaneously be made on the second task, namely, finding ways to increase private spending.

In principle, private spending could be mobilized by having the better-off pay for publicly provided services, or having them pay for privately provided services that would otherwise constitute a demand on the public system, or both.

In a curious way, the health system in Brazil, as it has evolved in the 1980s, almost seems designed to mobilize non-governmental resources from the better-off (through company and individual contributions to group health plans), while ensuring that these individuals still have a vested interest in the public system (since they are thrown back onto the public system for potentially catastrophic procedures that the group health plans generally do not cover). In Chapter III-4, the report discusses ways in which this creative mobilization of private resources could be further fostered.

The system has failed, however, has failed to take advantage of the "space" created by the reduced use of the public system by the better-off to provide

more and better services to the poor. This remains the great task at hand.

RESOURCE ALLOCATION: TOO MUCH IS SPENT ON TREATMENT AND TOO LITTLE ON PREVENTION^(21,162,163)

As public health spending in Brazil has grown, so, too, has the proportion spent on curative care. In 1965 36% of public funds was spent on curative services; by the mid-1980s the proportion was 85%⁽¹⁶³⁾. As shown earlier, 70% of total public spending is on hospitals alone. The corollary to this is that the proportion of total spending used for basic care and preventive programs has declined⁽¹⁶²⁾.

The weakness of the primary care network means that hospital emergency rooms are swamped, largely by relatively simple cases (80% of which could be treated more effectively and less expensively at the primary level). What is needed is an integrated "health module" system, in which the primary network functions as the port of entry for most cases, and in which referral up (and back) is necessary only for the small minority of cases that cannot be resolved at the primary level. This concept of an integrated health module is now widely accepted as an essential element of public health reform in Brazil.

Many Brazilian public health professionals argue that the prevention/cure dichotomy is an outdated concept, since the objective of the health system must be to meet the full health needs, preventive and curative, of the individual. While this argument has some merit, it is nevertheless a narrow equation of personal medical care services with health care. As was argued in Part II, many, if not the majority, of priority public health actions must occur outside of the "sickness care system". An effective health system would allocate a far larger share of resources to such actions and a far larger share of resources currently going through the medical care system to preventive programs. This is recognized by Article 198 of the Constitution of 1988, which mandates that "priority be given to preventive actions"⁽⁶²⁾.

Unit costs of some medical procedures are so high that insurance is a universal feature of health care systems in developed countries. These systems,

public or private, protect individuals from so-called catastrophic costs. But once these costs to individuals are minimized, the demand for such procedures escalates and the bill for meeting the sum of individual demands exceeds the collective willingness to pay. Rationing of medical care is therefore inevitable, even in privately-financed systems. Demands on the health care system in Brazil will increase as a result of demographic and epidemiologic changes, as access to publicly financed health services becomes universal and as high-technology treatments become available. It is critical that criteria for the inevitable rationing be specified explicitly; otherwise, implicit rationing will inevitably mean giving low priority to the highest priority item, namely, service to the needy.

HOW TO FINANCE COST-EFFECTIVE PREVENTIVE SERVICES

In Chapter II-7, the cost-effectiveness of various preventive activities were assessed. Some questions remain:

- What should the mix of public and private financing be for the "good buys"?
- How much would a package of cost-effective interventions cost? and,
- What institutional changes are required to institute a sustained national effort to improve disease prevention and health promotion activities?

As described in Box 1, standard economic theory advocates the use of public resources for public goods (which are subject to externalities or excludability)⁽¹⁶⁰⁾. There is no question regarding the use of public resources to finance classic public goods (such as air pollution control and the provision of health information) in Brazil. But what of other preventive activities (such as cost-effective cervical cancer screening programs) in which the benefits accrue principally to the individuals availing themselves of the service? As discussed in Chapter II-2, economic theory would suggest that public resources be used to provide consumers with information on treatment options and consequences, but that the consumers themselves pay for the service. Given the overall structure of health financing in Brazil today, this would be the wrong decision. Because curative care is publicly financed, the costs of treating a complicated case of cervical cancer are borne by the public sector and

not by the individual. For now, the principal task is to greatly increase preventive actions. For the present, at least, public financing is appropriate for those preventive actions that are most likely to be cost-effective.

How much might an intensive program of cost-effective preventive actions cost? Given the paucity of data from Brazil, and the wide range of estimates available from other countries, an estimate of costs is indicative at best. On the basis of data from other countries, it is estimated that an intensive information and education campaign might cost between 0.005% and 0.025% of GNP per year⁽¹¹⁾. Costs in Brazil may well be at the low end of this spectrum: a recently-initiated, intensive national highway safety education program costs under \$10 million per year, or about 0.003% of GNP per year. For illustrative purposes it is assumed that intensive national education and information programs in Brazil cost about \$15 million per year. A national cervical screening program is estimated to cost about \$30 million per year⁽¹⁶⁷⁾.

Thus, if an initial program were to include the items indicated as most cost-effective on Table II-4 (an anti-smoking campaign, vigorous public information campaigns on alcohol and drug abuse, exercise and traffic safety, and an intensive and reasonably-organized national cervical screening program) and were also to include an intensive AIDS education and information campaign, the total costs would be of the order of \$100 million per year, or about 3% of public (and 1.5% of total) spending on health in Brazil. It is estimated that in 1988 total public spending for the control of chronic and degenerative diseases and AIDS amounted to about US\$57 million.

There are two policy implications. First, even without precise data on costs and benefits of actions designed to promote adult health in Brazil, it is clear that present spending on prevention (both within the health sector as it is currently defined, and in related sectors, such as transport, environment and labor) should be substantially increased. And, second, there appears to be a need for establishing a federal institution for health promotion and disease prevention which would:

- set priorities for health promotion and disease prevention activities within the health sector and in other relevant sectors;
- establish norms and guidelines for health promotion and prevention programs;

- work with and provide technical assistance to state and municipal secretariats of health, as well as to relevant agencies in other sectors (such as transport and industry);
- conduct applied research to assess the costs and benefits of different prevention and promotion activities and to develop models for the cost-effective institution of disease prevention and health promotion activities.

Finally, there are numerous ways in which a changed regulatory environment could stimulate greater participation from the private sector in health promotion and disease prevention. To take three of many possible examples:

- improving environmental policies and the institutional capacity of environmental agencies would stimulate industries to invest in pollution control;
- strengthening the institutional capacity of occupational safety and health agencies would lead to increased investment by industries in occupational safety; and
- amending automobile insurance policies so that insurance rates increased not only for accidents involving property damage (as is presently the case) but also for accidents involving pedestrians would stimulate safer driving.

CHAPTER III-4: USING PUBLIC RESOURCES MORE EFFICIENTLY*

The health sector in Brazil faces a daunting challenge. Demands for health care will rise substantially in the near future, while resources available for meeting these demands will grow slowly at best. A fundamental challenge for the health system is therefore "to produce more with less". More services of better quality must be produced with approximately the existing level of public resources. In a word, the provision of publicly-financed health services must be made more "internally efficient".

This chapter addresses this critical issue. The first section analyzes the efficiency with which private and public providers currently deliver publicly financed health services in Brazil. The second section provides a broad overview of the closely related issue of cost-containment, comparing the experiences of Brazil with those of other Latin American countries and with the industrialized countries of Western Europe and North America. The third and concluding section describes the challenges and opportunities facing Brazil in building a modern and efficient health care system mobilizing private as well as public resources.

THE CURRENT SITUATION:

The rapacious private network^(21,34,36)

As was noted in Part I, the social security system relied heavily on accredited private providers (the so-called network) for services in the boom years of the 1970s. Resources were no constraint, budgets boomed (in the case of health service by an average of 13% a year over the decade) and there was little incentive to monitor the private contractors closely. By the early 1980s, the situation had changed drastically, and, for the first time, the social security-funded health system had to worry about efficiency.

The obvious place to start was with the network. This was not a "private" sector which depended on

* Background papers on the financing of health services in Brazil were prepared by Cordeiro⁽³⁴⁾, Correia de Campos⁽³⁵⁾ and Medici⁽³²⁾.

market forces, but could objectively be described as a parasite of the state apparatus, completely dependent on the social security system for its sustenance. Since 1968, the network had become accustomed to generous public subsidies for building hospitals and automatic payment for bills submitted. By the early 1980s, private contractors provided about 80% of hospitalizations and 70% of medical consultations financed by INAMPS.

The distortions in such a system were inevitable and major. Most flagrant was widespread fraud through billing for "phantom patients" and "phantom procedures". Somewhat less sensational was physicians' common practice of using their public service to recruit patients for their private, network, practices. At a more subtle and pervasive level, the network responded to a set of incentives that paid physicians whatever they billed to provide virtually unlimited services to patients who bore none of the costs directly.

In the mid-1980s, INAMPS started to come to grips with the network, which by then accounted for over 70% of hospital beds in Brazil. A series of reforms were undertaken to curb its excesses and to improve the efficiency with which public resources were used via the network. INAMPS concentrated first on hospitalizations. Fundamental changes included: pre-set rates for particular procedures (in place of physician-determined fees); more systematic and thorough audits; establishment of public reference centers for high-technology medicine; and review and modification of procedures whereby contracted suppliers procured high-cost items.

As a result of political changes in the federal government in 1988 and 1989, there have been significant setbacks in the application of some of these innovative reforms, but these appear to be only temporary. However, opposition to reform is no longer over forms of relationship between the public financing agency and the contractors, but over the levels of remuneration that are set. The instruments for motivating the private sector to provide efficient publicly financed services appear to be irrevocably in place. The task for the public sector now is to learn to use these instruments

to the maximum benefit of those who use the publicly financed health care system.

The public sector "black hole"^(34,38,162)

While the network can be characterized as "rapacious", the public institutions that provide health care in Brazil are aptly described as a "black hole", into which many resources are poured to little effect. (There are, needless to say, many fine providers in both the network and the public system to whom these epithets do not apply.)

In the 1970s, as the network became the dominant provider of health services, the general quality of public sector providers declined. A central objective of the INAMPS reform program was the reversal of what was perceived to be a long period of discrimination against public sector providers. Accordingly, INAMPS funded a massive investment program to restore the capacity of the public sector to provide high-quality care, and used its control over prices to encourage the use of public providers. As shown in Figure III-10, these efforts resulted in a marked increase in the proportion of services provided by the public sector.

The focus of this investment program was on physical rehabilitation of facilities. Little attention was paid to improving the efficiency with which these resources are applied, however, and incentives for cost escalation were actually built into the system. For instance, university hospitals have every incentive to use complex and expensive technology, because the level of reimbursement per procedure is higher the greater the level of "complexity" of the hospital.

From many perspectives, it is evident that the efficiency with which public sector institutions deliver health care in Brazil is very low. In many cases, a provider's lack of information on inputs, outputs, costs and performance is so acute that it is not possible to accurately describe how low its efficiency is. Because of the dearth of information, a picture of the inefficiency of the public sector providers is necessarily largely anecdotal. For instance, it is reported that:

- Public facilities pay an average of about 40% over nominal market prices for equipment, while the private sector pays about 40% below these nominal market prices;
- In public hospitals it is common practice to hospitalize poor patients, not because they need

to be hospitalized, but as a way of ensuring that they get free medicines which they might otherwise not be able to afford;

- It is common for patients to be retained in a hospital for pre-operation exams, for the sole reason that this enables the patient to "jump the queue" in the outpatient facility, and that
- It is common to have 40% or more of equipment non-functional in public health facilities⁽¹⁴⁴⁾.

The relative efficiency of the public and private sectors

INAMPS funds health services delivered by both public and private providers. What is the relative efficiency with which these services are provided?

Since 1984 private providers have been paid a fixed fee for a patient presenting a particular type of pathology (the AIH system). More recently INAMPS has started to apply the AIH system to university hospitals, too. Data are available on the distribution of pathologies among patients hospitalized at university hospitals since late 1987⁽⁷⁰⁾.

In recent years, the private sector has received only about 40% of total INAMPS payments for hospitalizations, but has accounted for 67% of the hospitalizations⁽⁹⁸⁾. That is, per hospitalization, INAMPS has paid public providers about 3 times $[(60/33)/(40/67)]$ that which it has paid private providers.

It is claimed that this difference is reasonable first, because the private network deals primarily with simpler pathologies, and, second, because, within any particular type of pathology, the more complicated (and expensive) cases are treated by public sector providers.

Figure III-15 presents data on the patient mix attended by private and public hospitals. While the proportion of private hospital patients is higher for some simple pathologies (such as infectious and respiratory diseases), the "simple = private" equation does not always hold. For example, patients with cardiovascular disease account for a greater proportion of private than public patients.

One way of getting an overall impression of the effect of patient mix is to weight the public and private profiles by a relative cost of each pathology (as per INAMPS reimbursement levels, also shown

on Figure III-15). The upshot is that, on the basis of pathology differences alone, one would expect only a 2% higher cost per hospitalization in university hospitals than private hospitals. As described earlier, the actual difference is 200%.

What of severity within each pathology? One (not completely satisfactory) way of examining this is to compare INAMPS figures on hospital mortality for public and private hospitals⁽⁷⁰⁾. Again, the picture is mixed. Mortality rates per hospitalization for cardiovascular diseases are in the predicted direction, with rates in public hospitals 60% higher than in private hospitals. For cancers, however, the reverse is true, with mortality rates per hospitalization about 20% higher in private hospitals. Overall, however, mortality rates per hospitalization in public hospitals are about 70% higher than in private hospitals, suggesting that, in general, public hospitals do tend to see the more seriously-ill patients.

In addition to these patient-mix issues, there are other difficulties in comparing the costs of publicly financed public and private providers. On the one hand, in addition to treating patients, university hospitals train medical personnel and carry out research. On the other, university hospitals have additional sources of funds (annual allocations from the Ministry of Education and capital grants from INAMPS) which private providers do not have access to.

Given these uncertainties, it is not possible to arrive to any definitive conclusion about the relative efficiency of public and private providers of INAMPS financed services. It would, however, appear that:

- differences in pathology mixes are slight and could account for only small differences between average public and private sector cost per hospitalization;
- patients treated at public hospitals appear to be significantly sicker than those treated at private hospitals, but the difference would not appear to justify an average public cost 200% higher than the average private cost.

And what of the relative efficiency of the HMOs? To date there has been little systematic study of these organizations, and thus quantitative comparisons of efficiency are not possible⁽⁸²⁾. However, there are indirect indications that many of the HMOs are efficiently managed and operated. Competition for market share is intense. Although advertising plays

a role in this competition, considerations of quality and cost probably play a more fundamental role. Thus, although the group medicine companies (such as Golden Cross) dominate advertising in this sector, their market share has been declining relative to the medical cooperatives, which offer a higher quality of service at about the same cost. Fierce competition for market shares, and the evident role of quality and cost in capturing a market share, almost surely drives companies in this sector towards greater efficiency. It is widely acknowledged that the HMOs are the only health care organizations in Brazil to adopt modern management and information systems.

SOME SUCCESSES:

The Federal level

As described above, the overall efficiency of publicly provided health services in Brazil is low. In recent years, this has been widely acknowledged, and several important steps have been taken towards improving efficiency. INAMPS took the lead in these modernization reforms; at the state level, Parana and Sao Paulo have been leaders.

The INAMPS reforms were designed, in part, to ensure that more, better-quality services were produced with INAMPS' resources. These modernization reforms consisted of: a new payment system (described earlier); a new system for dealing with high-technology; and a new procurement system for high-cost orthoses and prostheses (such as pacemakers, dentures and braces).

In 1987 INAMPS initiated the Integrated High-Technology Systems (SIAT) program⁽⁸⁴⁾. Currently, operational programs deal with cardiovascular diseases, trauma-orthopedic systems, hemodialysis and transplants, image diagnoses and organ transplants. In each case, the program is led by a public hospital "of excellence", which establishes technical norms (including definitions of procedures that can be done by different levels of qualified facilities), material and price standards and evaluation and control mechanisms.

In the spirit of the SIAT program, the SUDS in Rio de Janeiro has developed an interesting proposal for the assessment and use of high technology. It is proposed to constitute a consortium of public and private sector agencies with expertise in high-tech

medicine to review the costs and effectiveness of high-technology options, and to provide information for use by both the public and private sectors. As a parallel mechanism for controlling the use of high technology in the state of Rio de Janeiro, SUDSRJ proposes to set up a center for the application of high-technology procedures.

A major area of modernization by INAMPS is in the procurement of orthoses and prostheses, especially those used in heart surgery⁽³⁴⁾. In 1986 these items cost INAMPS \$126 million. A study by the Zerbini Foundation (which manages INCOR, the Heart Institute of Sao Paulo) detected extremely wide variations in prices among suppliers and average prices that were twice as high as those in the US and 3 times as high as those in neighboring countries. A detailed survey of suppliers was carried out, and standards (both in terms of quality and price) established. The effects were dramatic: The average price paid for heart pacemakers (which accounted for over 50% of costs of these items) dropped by over 50%⁽³⁴⁾.

The State level

Throughout the 1980s the state of Parana has been the site of innovative health services management. The "Curitiba Plan"⁽¹⁸³⁾ provided for a triage at INAMPS and other public facilities in which each walk-in was examined by a physician-auditor and either treated immediately or referred to a higher-level service. Under the plan, the fee system was also altered by paying a fixed amount for a given procedure as prescribed at the public facility, rather than paying for all items as charged by the secondary facility. These changes were reported to have reduced hospitalizations by about 30%, and to have improved the quality of care.

As part of the reform of ambulatory care in Parana, the System for Information and Control of Outpatient Care (SICAPS) was developed⁽³⁵⁾. SICAPS provides managers at different levels with previously unavailable data on services provided, payments made and costs.

Sao Paulo, where the state SUDS (SUDS-SP) has initiated a process of modernization, has been the other major innovator at the state level. The cornerstone of the Sao Paulo program has been the decentralization and "municipalization" of responsibility for the delivery of health services⁽¹³¹⁾. At a technical level, there have been innovative

service and management advances to accompany this political process. In several cases these have started with the INAMPS instruments, and have been extended to cover both private and public suppliers, and both hospital and outpatient services. The advances include:

- **Medical modernization:** Expert committees have been constituted to specify technical norms for the treatment of all major medical care categories.
- **Planning:** Four key members of each of the 62 regional health authorities have received well-conceived and tailored management training, and have subsequently elaborated strategic plans for their authorities.
- **Management of inpatient services in public hospitals:** SUDS-SP is adapting the AIH system (which INAMPS uses to pay private contractors) for use in all public hospitals in the State of Sao Paulo.
- **Management of outpatient services provided by both the private and public sectors:** SUDS-SP is in the process of adapting Parana's SICAPS system in three ways. First, the instrument (known as the Sistema de Informacao Ambulatorial or "SIA-SUDS") is designed to be not only an accounting tool, but also an epidemiologic tool for evaluating program performance. Second, the instrument is designed to be computerized. And third, it is envisaged that the procedure will be applied to both the private and public sectors.
- **Cost accounting systems:** A simple but effective cost accounting system (Sistema de Apuracao de Custos, or SAC) for monitoring the volume of activities and costs of each basic health care unit in a service module has been developed and applied for over a year by one of the regional health authorities. After review and modification, it is planned that the SAC will be applied in all of the 62 regional health authorities in the state of Sao Paulo.
- **Human resources management:** SUDS/Sao Paulo is experimenting with an Integrated Management System (PGI) by which physicians are rewarded for full-time dedication to a public sector job, which provides incentives for working in the difficult peripheral areas, and which links the level of remuneration of workers in a health facility to the productivity of the facility.

In summary, some progress has been made in Brazil. The initial stage was to identify "outliers" who overcharged because of a variety of fraudulent

procedures. The second, and more difficult, stage is to advance the whole "production frontier" forward. INAMPS, in particular, has shown how much can be achieved in the initial stage. The experiments in Parana and Sao Paulo are the most advanced attempts in Brazil for dealing with the second stage. Incipient as these innovations may be, they represent a philosophy and practice that are vital for the health sector in the whole of Brazil.

COST-CONTROL IN INDUSTRIALIZED COUNTRIES AND LATIN AMERICA^(1,88,111)

The fundamental dilemma of the health sector in Brazil is how to meet rising demands (all of which are legitimate) with limited resources. A major problem is that as the costs of established services continue to rise rapidly, it becomes correspondingly more difficult to redirect resources to the highest priority need, namely improving the access of underprivileged groups to better quality health services, including high-cost technology. Accordingly, a major task in Brazil is to find ways of containing costs of medical care. Because this is a global problem, it is appropriate to ask what other countries have done to contain costs, to compare these efforts with what has been done in Brazil and to try to identify areas that appear promising for Brazil.

Two major reviews of cost-containment experiences have been conducted: one of the industrialized countries of the Organization for Economic Cooperation and Development (OECD)⁽¹¹¹⁾ and one (commissioned for this study) of Latin America and the Caribbean (LAC)⁽⁸⁸⁾. The results of these reviews are summarized in Table III-2.

The table classifies cost-containment methods according to whether they act on supply or demand and, for each of the methods, into a set of operational categories (columns 1 through 22). The table also indicates (rows 1 and 2) whether a method operates through direct controls or incentives, and whether it is a short-term or long-term approach. Then, for each of the methods, the table gives:

- examples of OECD and LAC countries that use the method (rows 3 and 4);
- a qualitative indication of frequency of use of the method in the OECD and LAC (rows 5 and 6);

- a qualitative indication of the extent of use of the method in Brazil (row 7);
- a qualitative indication of the likely long-term effect of the method on efficiency (row 8); and,
- a qualitative indication of the potential of the method in Brazil.

Rows 1 and 2 show, for example, that the "payment per diagnosis" method (column 12) operates through incentives, and that it is expected to have both short- and long-run effects. Rows 3 through 6 show that the method is not widely used in either the OECD or LAC, but that it is used in France and the US. The effect on long-run efficiency is thought to be considerable, and the method's potential as a tool for further cost-control in Brazil, substantial. This would involve modification of the AIH method, applying unit payments per diagnosis, not procedure. Of course, there are also problems with methods of this sort (known as Diagnostic Reference Groups, or DRGs), such as how to take severity of disease into account.

A comparison of row 7 (Brazil) with rows 5 and 6 (OECD and LAC) shows that the public sector in Brazil has used only a limited set of the instruments that have been tried and tested in other countries. More specifically, it is apparent that Brazil has concentrated disproportionately on the instruments that operate on supply and rely on direct controls (the left of the table), and has done little to use those that operate more through incentives, including those that operate on demand (to the right of the table). Even more specifically, the table suggests that the most promising options for Brazil include:

- attention to drugs (including monitoring physicians' prescription patterns [column 7], more effective organization of purchasing of drugs [column 10] and use of generics and drug lists [column 15];
- improvement of the AIH system [column 12]; and possibly even capitation systems in both inpatient and outpatient facilities [column 13];
- movement towards prospective budgeting [column 14],
- continuation of attention to defining high-technology treatment facilities and regimes [column 16];
- development of a framework for allowing competition between public and private providers [column 17];
- unification of the INAMPS and state and local systems as envisaged by the SUDS [column 18];

TABLE III-2: The effects of cost-containment methods, their use in the OECD and the Americas, and their potential role in Brazil

	A: METHODS WHICH AFFECT SUPPLY														B: METHODS WHICH AFFECT DEMAND							
	(i) QUANTITIES OF INPUTS					(ii) QUANTITIES OF OUTPUTS		(iii) PRICES OF INPUTS			(iv) PRICES OF OUTPUTS				(v) RULES				USER CHARGES FOR:			
	PEP-UN- NEL LEVELS	OPER- ATING BUDGET	EQUIP- MENT TRUC- TION	CONS # OF DOCTORS	# OF DOCTORS TRAINED	PATIENT QUOTAS	DRUG PRESCRIP- TION PATTERNS	FEES & SAL- ARIES	EQUIP- MENT PRICES	DRUG PRICES	MAN- PULATE RELATIVE PRICES	PAYMENT PER DIAG- NOSIS	CAP- ITATION PAY- MENTS	PROS- PECTIVE PAY- MENTS	DRUG LISTS	HIGH- TECH PROC- EDURES	PRIVATE SUPPLY OF SOME SERVICES	REDUCE DUPLI- CATION	IN- PATIENT SER- VICES	OUT- PATIENT SER- VICES	DIAG- NOSTIC TESTS	DRUGS OUTSIDE HOSPITALS
[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]	[11]	[12]	[13]	[14]	[15]	[16]	[17]	[18]	[19]	[20]	[21]	[22]	
(1) DIRECT CONTROLS:	X	X	X			X	X	X	X	X					X	X		X				
(2) INDIRECT CONTROLS:				X	X			X	X	X					X	X		X				
(3) EXAMPLES OF OECD COUNTRIES:	Italy Portugal UK	France Spain	UK Denmar	erman UK France	Portugal Spain	Belgium France Holland	Germany UK Spain	Belgium France Nembourg	German Italy France	Belgium Germany	France	Italy	Portugal	Germany Greece Spain	UK	Germany; UK	Portugal Italy	Belgium Germany Sweden	Belgium Portugal Sweden	Germany Italy Belgium	Italy Holland UK	
(4) EXAMPLES OF COUNTRIES IN THE AMERICAS:	Costa R. Panama Canada Jamaica	Ecuador Canada	Canada Chile Panama	Canada Mexico	Brazil	Argentina US	Argentina Canada Panama Peru	Brazil Colombia Peru Ecuador	Argentina Canada Colombia US	US	Canada Argentina Uruguay Costa R.	Canada	Canada	Canada Colombia Honduras Panama	Brazil	Jamaica; US; Uruguay	Argentina Brazil Costa Rica Nicaragua	Bolivia Chile Jamaica Peru Uruguay	Argentina Chile Bolivia Honduras Uruguay	Bolivia Chile Jamaica Uruguay	Argentina Brazil Ecuador Nicaragua	
(5) FREQUENCY OF USE IN OECD?	++	++++	++	+++	++++	+++	+++	++	+	++++	+++	+	+	+	++++	++	+++	+++	+++	+++	+++	+++
(6) FREQUENCY OF USE IN AMERICAS?	+++	+++	+++	+++	+	+	+	++	+	++	+++	+	++	+	++	+	++	++	++	++	++	++
(7) USED IN BRAZIL?	+++	+++	+++	+++	o	+	+	+++	++	+	o	o	o	o	o	++	+	+	o	o	+	+++
(8) LIKELY LONG-TERM EFFECT ON EFFICIENCY	+	-	-	+	?	+	++	-	+	++	+++	+++	+++	+++	++	+++	++	++	+++	+++	+++	+++
(9) POTENTIAL IN BRAZIL?	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o	o

NOTES: Frequency with which a cost-containment instrument is used (rows 5, 6 and 7):
 "o" implies never; "+" occasionally; "++" moderately; "+++ frequently, and "++++" implies use is almost universal.

Effect on efficiency (row 8):
 "-" implies that the measure reduces efficiency; "o" that it is neutral; "+" that there is a small beneficial effect;
 "++" that there is a moderate beneficial effect and "+++ that there is a large beneficial effect.

Potential in Brazil (Row 9):
 The potential is considered large ("+++") if: the measure has a large effect on efficiency, AND the measure has been applied successfully elsewhere, AND the measure has not been used much in Brazil.
 The potential is small ("o" or "+") if: EITHER the measure has a small effect on efficiency; OR the measure has already been as fully applied in Brazil as elsewhere.

PRINCIPAL SOURCES: Abel-Smith (1), The Economist (49) and Marquez (89).

- introduction of user charges for the middle class and the rich for selected inpatient and outpatient services and diagnostic tests [column 5], as is apparently already done at the Heart Institute (INCOR) in Sao Paulo.

IMPROVING EFFICIENCY

Improving the internal efficiency with which publicly financed health services are provided in Brazil is not a simple task, since changes are required in deep-seated political and institutional cultures.

Better definition of public and private roles

The relationship between the public and private health sectors is complicated in many countries. Brazil is no exception. In the years of the "miracle" the network flourished; controlling the private contractors has been a necessary and major task of public health reform in the 1980s⁽³⁴⁾. Predictably, it has been (and is) a bitter battle, the legacy of which is a deep polarization. To public health reformers, the "private sector" represents everything that is reprehensible: to the network, the reformers represent a dangerous idealism that does not acknowledge the endemic deficiencies of the public sector in Brazil. The result is close to a war. As in most wars, the first casualty is the truth. The reformers fail to acknowledge that the private sector can do anything of value; the private sector denounces all attempts at change.

From the experience in other countries with pluralistic economic and political systems, it is clear, first, that both the private and the public sectors have important roles to play in providing health services, and, second, that sound public policy is critical. In Brazil, it is the public sector that decides "the rules of the game"; that regulates, by norms or incentives, the behavior of providers and users; that directly finances about 50% of all spending in the sector; that is a major direct provider of services and that is responsible for human resource development.

The new Constitution mandates that public and philanthropic providers be strengthened and that consideration be given to the private for-profit sector as a complementary but essential element where public provision is inappropriate because of lack of capacity, efficacy or efficiency. The definition of the respective roles of the public and

private sectors in Brazil must start with the constitutional provisions, and must be based on an objective assessment of the relative strengths of the different sectors.

From the experience of Brazil and other countries, it is clear what the public sector should do and does well, and what the private sector should do and does well⁽¹⁰⁰⁾. The fundamental role of the public sector is to set policy so that the health of Brazilians is protected and improved. The public sector has almost sole responsibility for the vital tasks of regulation, promotion and education, and a major role in financing. Provision of services should be done by whatever entity can, within the overall policy set by the public sector, provide the prescribed services most efficiently.

The public sector in Brazil today is misdirected and ineffective⁽¹⁰³⁾. It devotes relatively little attention and resources to its central function, that of regulator, promoter and educator. On the other hand, in the area in which it devotes most of its attention – the provision of services – it performs poorly and inefficiently. In part because of the absence of appropriate policy, the network is also a low-quality, high-cost provider of services. Not surprisingly, the HMOs, which have grown to fill the vacuum left by the public sector and the network, appear to be doing the best job.

What, then, might be an appropriate public/private configuration in the Brazil of the 1990s? The public sector has a huge task, both as definer of "the rules of the game" and as provider. First, as detailed in Part II, major investments need to be made by the public sector in promoting health and preventing disease in Brazil. Second, with respect to the provision of personal health services, the public sector has to define the rules so that public resources are supplemented by private resources and, given these resources, the best possible types and qualities of services are provided.

Some elements of the structure of the health services sector are clear. The private sector has not voluntarily provided adequate health care to the poor, and will not autonomously do so. The public sector can address this problem in two ways. The characteristic (and understandable) response is that such services must be provided directly by the public sector. However, it is also possible that poor people might get better services if the public sector emulated the modern industrial sector in Brazil or

the publicly financed health system in Canada in this regard. The modern industrial sector (in Sao Paulo especially) finds it more efficient to contract out the provision of health services to HMOs than to provide such services directly to its workers. Similarly, in Canada the provincial governments contract out the provision of inpatient and outpatient services to competing private providers. In Brazil, a regional health authority could experiment with having HMOs bid on providing services to its population, and concentrate its own efforts on monitoring the services provided. An important task for a state-level health secretariat might be to stimulate such experiments, and to monitor the comparative efficiency of the publicly provided and contracted-out models.

At the other end of the spectrum, it is clear that the HMOs will continue to have a major role in financing and providing services in the better-off industrial centers.

An impediment to breaking the public/private logjam is the frequent perception of "the private sector" as a homogeneous entity that follows the network patterns of behavior. In fact, the HMOs represent a qualitative break from the old, INAMPS-dependent, "private" sector. The *raison d'être* of the network is acquisition of public resources, often through archaic forms of political manipulation and falsification. The HMOs, by contrast, receive no public money directly, but compete vigorously, principally on the basis of cost and quality, for supplying health services to well-informed and sophisticated buyers.

While the HMOs receive no direct public funding, company-financed health plans are, in part, funded indirectly by public funds.

First, there is a mechanism whereby INAMPS pays a company for providing health services to its employees. This mechanism, however, is largely inactive, with such transfers declining by 86% between 1981 and 1987, to a point where they accounted for only US\$15 million in 1987⁽⁹²⁾.

A more complex and important set of questions concerns reductions in corporate and personal taxes as a result of company-financed health plans. With regard to corporate taxes, companies are allowed to claim medical benefits as operating costs, thus reducing a company's tax liability. With an average marginal corporate tax rate of about

35%, this means that every 100 cruzados of corporate spending on health care benefits results in a loss of corporate tax revenue of about 35 cruzados. With regard to personal income tax, fringe benefits lead to a loss of tax revenues because these benefits are not taxed. Given an average marginal tax rate of about 15% for workers in the formal sector, this implies that every 100 cruzados of corporate spending on health care benefits results in a loss of personal income tax revenue of about 15 cruzados.

Thus every 100 cruzados of corporate spending on health care benefits results in a loss of income tax of about 50 cruzados. Since corporate payments account for about one-half of all payments to the HMOs (the rest being payments by users themselves) this would imply that about 25% of the HMO bill is financed indirectly from tax revenues. In fact overall tax revenue losses are probably somewhat lower, since the income tax revenue loss is likely to be at least partially offset by an increase in indirect (consumption) tax revenues. This is because increases in labor costs due to corporate spending on health plans can, in part, be passed on to consumers.

In summary, although it is not possible to give a precise estimate of the magnitude of "indirect public financing of private health plans", less than 25% of the HMO bill appears to be financed indirectly from tax revenues. If the tax code remained unchanged, however, the magnitude of this indirect financing would become greater as the economy is liberalized. As argued by the World Bank^{*} and others, such tax breaks on fringe benefits constitute a distortion to the economy which should be eliminated as part of an overall tax reform.

As noted earlier, although services provided by HMOs are demonstrably superior to the available public services, the quality of the services offered by the HMOs leaves much to be desired. To some degree this will always be true, since resources are limited, but subscribers' desires are not.

A widely perceived flaw in such plans is that they generally do not cover the potentially catastrophic needs of their clients, who are referred back to the public system for catastrophic care⁽⁹⁴⁾. There are two ways of viewing this practice. On the one hand,

* World Bank, "Brazil: An Agenda for Tax Reform", forthcoming report.

those who consider HMOs to be opportunists that skim off the profits to be reaped through health care vigorously oppose these limitations on coverage. Indeed, in 1987 the Regional Medical Council of Rio de Janeiro petitioned the legal system to mandate that HMOs be required to cover all the medical care needs of subscribers⁽³⁴⁾.

On the other hand, this practice could be defended as exactly what one would like to have in the system. The problem of "medical catastrophes" is not that they are very common, but that when they do occur the costs are very high. In industrialized countries, they represent no more than one-fifth of total medical care costs⁽¹⁸⁾. If the proportion is roughly the same in Brazil, then, from the aggregate point of view, the public system is bearing a relatively small proportion of the total health care costs of HMO subscribers. From one perspective, this is an ideal arrangement. Because the public sector functions as the catastrophic insurer for modern sector workers and the middle class, these groups get some benefits from the publicly financed system. Pressures to reduce allocations of public funds to the public health sector are thus attenuated. (The danger, of course, is that this pressure is for more public spending for high-tech hospital care.)

In any case, it is clear that the HMOs will continue to be an important actor, especially in the industrialized cities. At a minimum, the public sector should monitor the quality of medical care given by such providers, and should provide potential consumers with objective information on the costs, benefits and limitations of the different group health plans. If the public sector were more affirmative about the presence of this modern and efficient private sector, there are two other relationships that might develop. First, as described above, this sector could possibly play an important role in providing publicly financed health services efficiently to underserved populations. And, second, the public sector could take advantage of the management innovations that the HMOs have pioneered in the health sector in Brazil.

Finally, what of the not-for-profit health providers, the so-called "philanthropics"? If the objective is to provide the maximum quantity and quality of services with existing resources, then current public policy (which gives these providers significant advantages over the for-profit sector) is inappropriate. The philanthropics and the "for-

profits" should compete on an even playing field⁽³⁵⁾. If the philanthropics can be as efficient as the private providers, then they will out-compete the private providers (because they do not pay profits). If the philanthropics cannot compete under such circumstances, why should their inefficiency be subsidized?

Making transfers transparent

The public sector in Brazil will continue to play a major role as a funder of health services. As required by both the Constitution and common sense, responsibility for administration of publicly financed health services will be decentralized to the states and municipalities. To date, such transfers between different levels of government have been governed by negotiated contracts and "conventions" – the food on which clientelistic politics have thrived. The solution to this problem is technically quite simple, requiring the definition of objective and transparent criteria (such as size of population, level of poverty, and level of local commitment of resources) to govern the transfer of these resources.

The importance of the federal-state problem is widely understood, and it is likely that a provision to this effect is likely to be included in the complementary law (to be considered by the Congress in late 1989). Rather less publicized is the equally important need for transparency governing state-municipal transfers and the necessity for corresponding legislative and administrative action at the state level.

Decentralization

In the years of military rule, decision-making power was heavily centralized in Brasilia. The principle of decentralization of power to state and local levels is enshrined in the Constitution of 1988 and will be a central element in public policy in the 1990s

Not only is decentralization a political imperative of a democratic society, it is also a pre-condition for a more flexible, responsive and modern public health system. For both political and technical reasons, decentralization of decision-making power to the state, regional and local government levels, and ultimately to the users themselves, is a cornerstone of the philosophy of the public health reform movement in Brazil.

As discussed earlier, a Presidential decree establishing the SUDS was signed two years ago. However, precisely because a centralized system is an effective vehicle for political machinations, this decree has been implemented slowly and unevenly. Nevertheless, positive results have been obtained in the states of Rio Grande do Sul, Parana, Bahia, Golas, Pernambuco, Rio Grande do Norte, Mato Grosso, Rio de Janeiro and Sao Paulo*.

It is not by chance that the state in which the SUDS has advanced furthest (Sao Paulo) is one in which a cornerstone of state public policy is decentralization (to the municipal level)(131). And it is also not by chance that it is in Sao Paulo that most attention has been paid to developing tools to help local managers use the resources at their control more efficiently. Decentralization is a pre-condition for improved efficiency, because it is the managers of regional and local health authorities, and even the managers of specific facilities, who know best what problems they face and who need to be able to decide how to use their resources to meet those challenges.

The final step in decentralization is empowerment of users and their involvement in the decision-making process(17). This is never a simple task, and is especially difficult where, as in Brazil, the political culture of paternal centralism has encouraged communities to hope that they might be the beneficiaries of "free" facilities and services from the state. Empowering communities also means that they have to learn about rational resource allocation and use. Even in societies with long histories of community involvement in public service delivery, an essential tool for setting priorities is user charges, imposed either directly or through local taxes. In a society like Brazil, where community organization is still incipient, such objective, non-political tools are especially important.

Ideally, the revenues generated through user charges should be maintained at the local level and used to improve facilities and services, both so that the community does not feel "exploited" by having to pay for services, and so that local managers have an incentive to implement user charges.

A final element of the process of user empowerment is providing consumers with information on the options they face in meeting their needs for health

* Hesio Cordeiro, personal communication.

services(17). Government has a vital role to play in informing consumers about the costs, benefits and quality of health service provided through the various public and private channels that consumers might consider using.

Modernizing management practices

The final element in extracting the most and best services from limited resources is the development and application of modern management practices at all levels of the health system.

Until quite recently, there was a marked asymmetry in the public health system in Brazil. While Brazil adopted modern clinical practices rapidly, and became a world leader in certain clinical techniques (such as cardiothoracic surgery), until very recently few of the modern management techniques were incorporated into the public health sector in Brazil. Although this remains true for most of the public health system, there are now (as illustrated by the SUDS-SP and INAMPS cases described earlier) signs of change.

As summarized on Table III-2, public health sector managers in Brazil have depended heavily on norms, attempting to improve performance by specifying what is and what is not "allowed". Experience in Brazil and elsewhere shows that such steps sometimes result in short-term gains in efficiency, but that they are inevitably undercut by "creative" responses and by bureaucratic rigidity and incapacity. More subtle and more effective tools for improving efficiency are the incentives (both to suppliers and users) described in Table III-2.

At the national level, INAMPS has made major progress in developing a set of tools (both regulations and incentives) for controlling hospital services provided through the network(34,35). Perhaps the most important of these tools is the AIH, which represented an important advance over the prior fee-for-service system, since it ensured that consistent rates were paid per procedure. The major drawback to the AIH is that the provider still has an incentive to use an excessive number of procedures. Some have argued that the next step might be to move from the AIH to a Diagnostic-Related Group (DRG) concept, in which the provider would be paid per diagnosis and not per procedure, while others have suggested that other patient

classification systems, which take account of severity, are more appropriate. Or perhaps it may be more logical to move directly to capitation systems (similar to those used by many of the HMOs in Brazil today) in which a provider is paid a specific amount (which may vary according to, say, the age of the population served) for providing specified services to a population. Although these potential evolutions of the AIH also have their drawbacks (and specifically require that the public authority have the capacity and tools to ensure that the quality of care is not reduced), the great advantage is that they give the provider the incentive to use resources efficiently in dealing with their patients. In this sense, these tools involve taking the decentralization process all the way down to the level of the physician.

With regard to improving the network's efficiency, INAMPS now faces two tasks. The first is to develop a process for setting prices that neither pays suppliers excessively nor (as is often the case now) pays them so little in real terms that they refuse to provide services, resulting in heavy overloads on the public system. The second task is to adapt the AIH-like systems (the SICAPS system of Parana, or its successor, the SIA-SUDS of Sao Paulo) to cover ambulatory services.

While INAMPS has made considerable progress in developing tools for improving the efficiency with which the network provides services, INAMPS has done little to motivate the "philanthropics" or public sector providers to improve efficiency. The principle should be that the public sector funder aims to get the most, and best quality services for the money available, irrespective of whether the supplier is a public or private agency⁽³⁶⁾. Thus, the management task is to develop a single set of tools (such as the AIH and SIA-SUDS) and apply these to all providers, both public and private, for all services, preventive and curative, inpatient and outpatient.

To be able to respond to a set of incentives, managers – of regional and local health districts and of specific facilities – need information. As described earlier, SUDS-SP has made a promising start (the SAC) in developing a simple cost accounting system for the managers of health modules. Some hospitals (such as the Hospital Humberto in Sao Paulo⁽³⁷⁾) have made some progress in developing information systems for hospitals. A great deal more work needs to be done to develop information systems on both cost

and performance that will provide managers at all levels with the information they need in the form that they need it. For this to become effective will require massive investments in "experiments" with different tools, in purchasing of equipment and the specialized information and management skills, and in training.

As described earlier, under INAMPS leadership, considerable progress has been made on developing cost-effective high-technology treatment regimes (SIAT). This work needs to be continued and extended (as is being done in SUDS/RJ), so that both private and public providers will choose to use high-technology equipment only when it is cost-effective. Where payment is from public funds, the key is not to tell the private sector how to invest (advice that it can simply disregard) but to send unequivocal signals through the payment system that the private sector will translate into investment priorities.

Finally, one of the most glaring sources of inefficiency in the public sector is its use of human resources⁽³⁸⁾. First, the composition of the health labor force is top-heavy, with 6 physicians per medical technician. Second, many physicians hold 2 or more jobs, with their energy and initiative often put primarily into their private job, while their public sector job is seen as a source of secure employment where they have to produce little and where they can recruit patients for their private practices. Modernizing the management of human resources in the health sector is a complex task. A detailed assessment of human resources policy in health is beyond the scope of this report, but will be a central element of a forthcoming study by the World Bank⁽¹⁶⁸⁾. In the present context, it is relevant to note only that the tools for achieving a more productive labor force are not primarily normative and regulatory tools, but, once again, those of incentives. The innovations being tried as part of the Integrated Management System in Sao Paulo are important first steps in this direction.

FIGURES

**Figure I-1:
Reliability and quality of mortality data**



Reliability:

**States in which more than
75% of municipalities report regularly**



Quality:

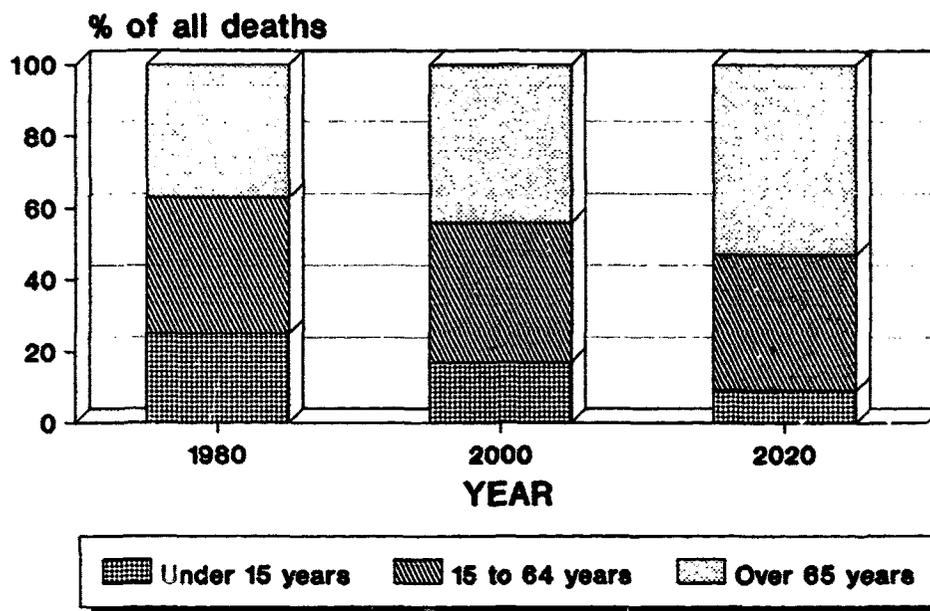
**States in which "poorly defined"
deaths account for < 25% of all deaths**



States with reasonable reliability and quality

**Source:
Ministry of
Health, 1987**

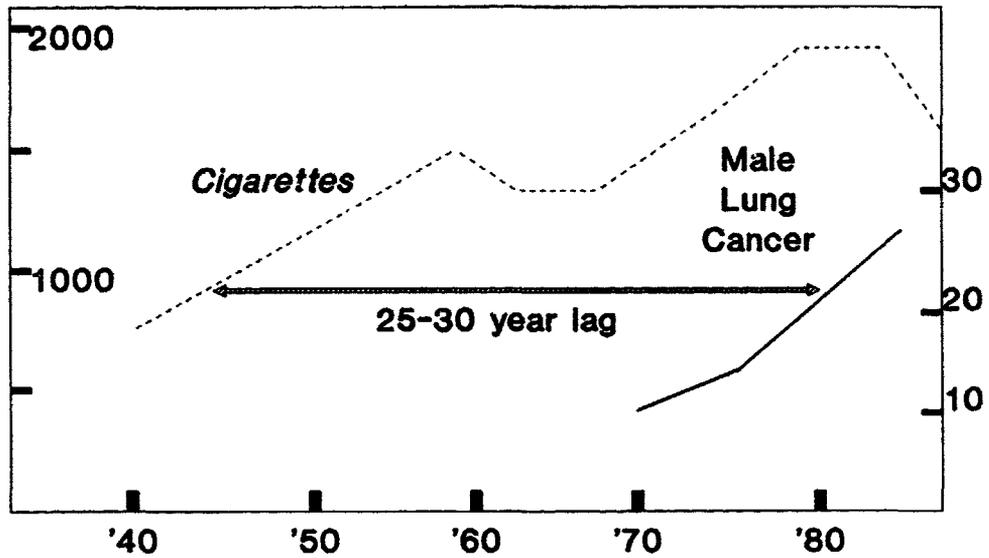
Figure II-1
The aging of mortality in Brazil



SOURCE: World Bank analysis

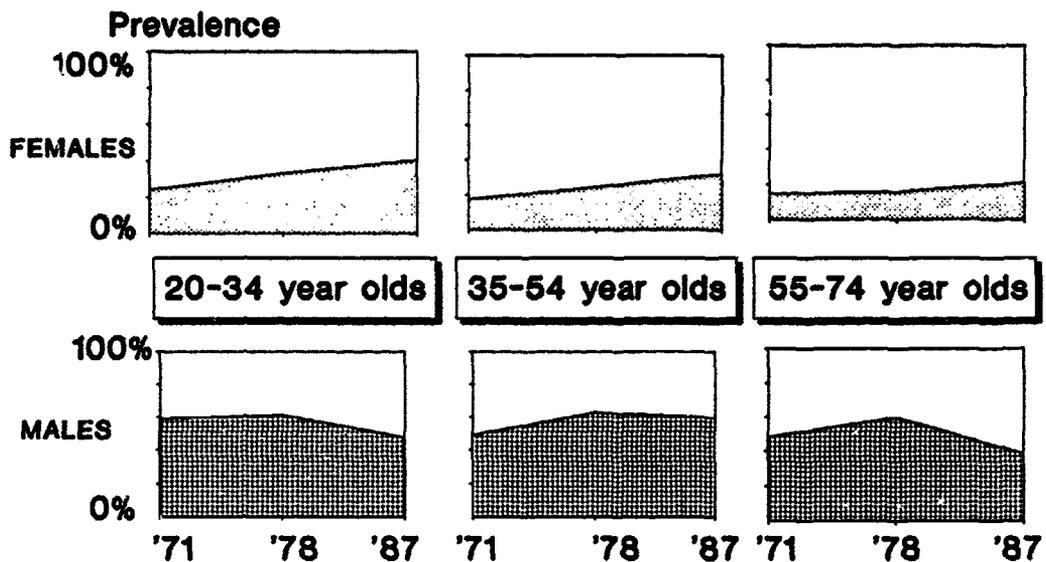
Figure II-2:
Per Capita Cigarette Consumption in Brazil
& Male Lung Cancer Mortality in Rio Grande do Sul

Cigarette/adult in Brazil *Lung Cancer Death /100,000*



SOURCE: Ministry of Health, 1988

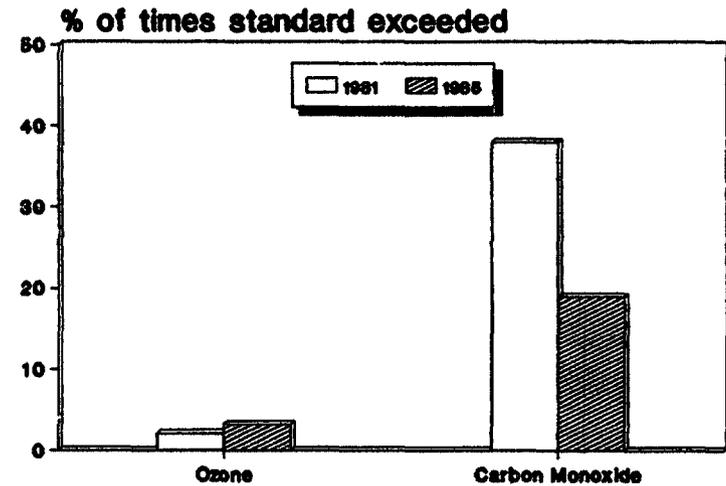
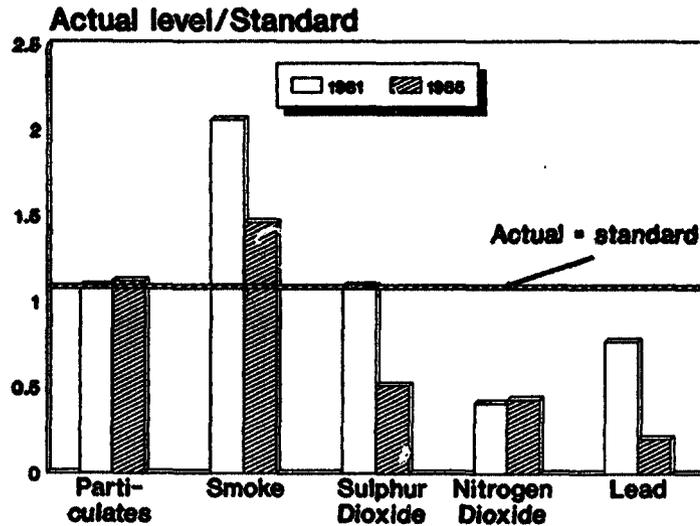
**Figure II-3:
Smoking Prevalence In South and Southeast
from surveys in 1971, 1978 and 1987**



SOURCE: Achutti, 1988

NB: Populations and age groups differ in each survey

Figure II-4: Levels of Air Pollution Relative to Air Quality Standards Sao Paulo, 1981 and 1985

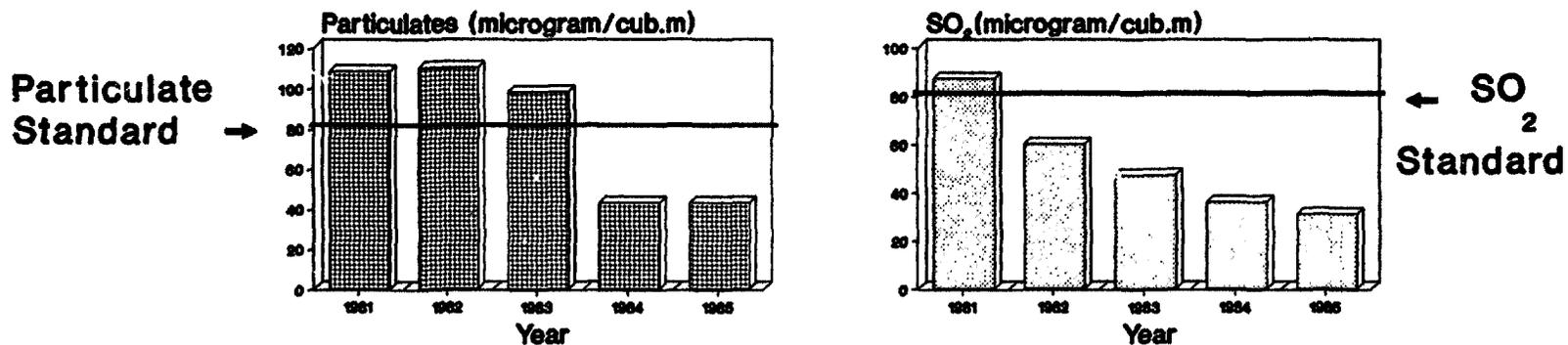


SOURCE: CETESB, 1986

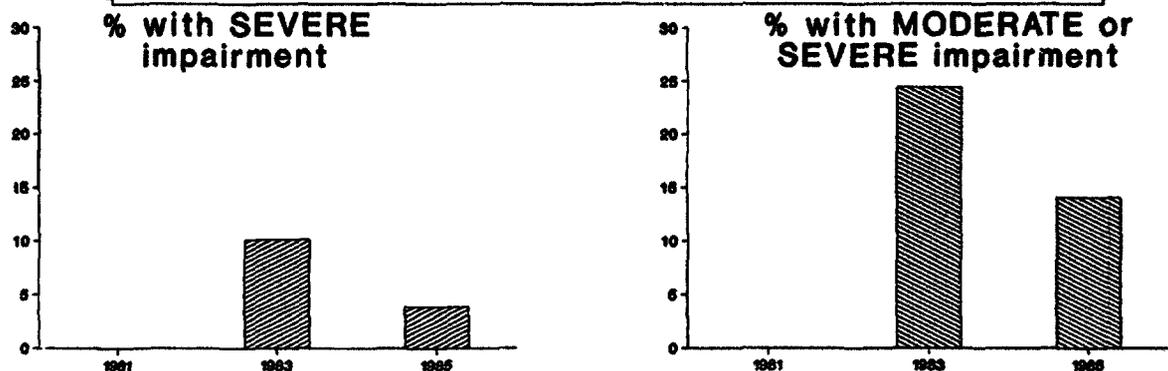
Figure II-5:

Air quality and respiratory function in Cubatao

Improvements in Air Quality

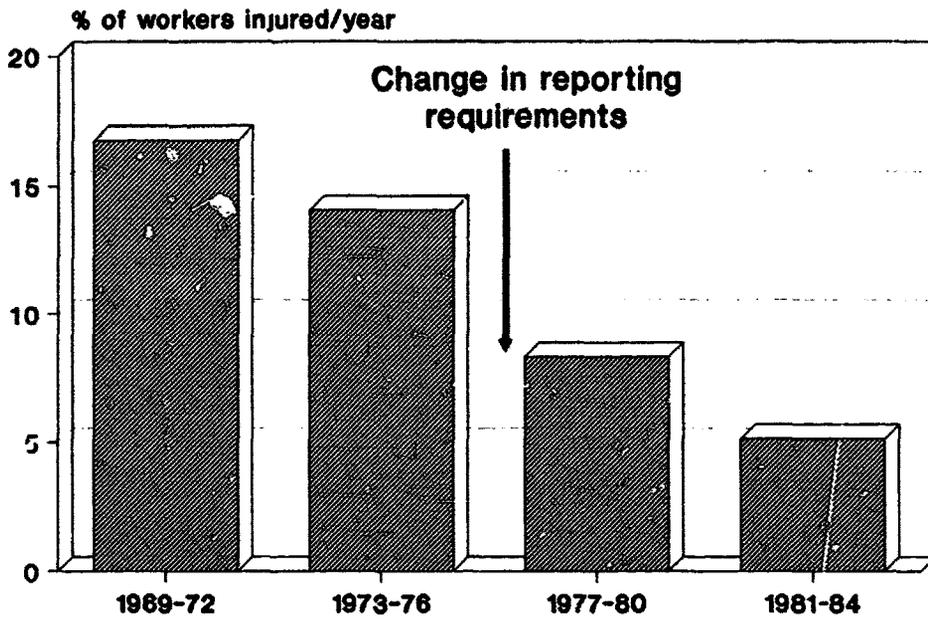


Reductions in Respiratory Impairment of Kindergarten Children



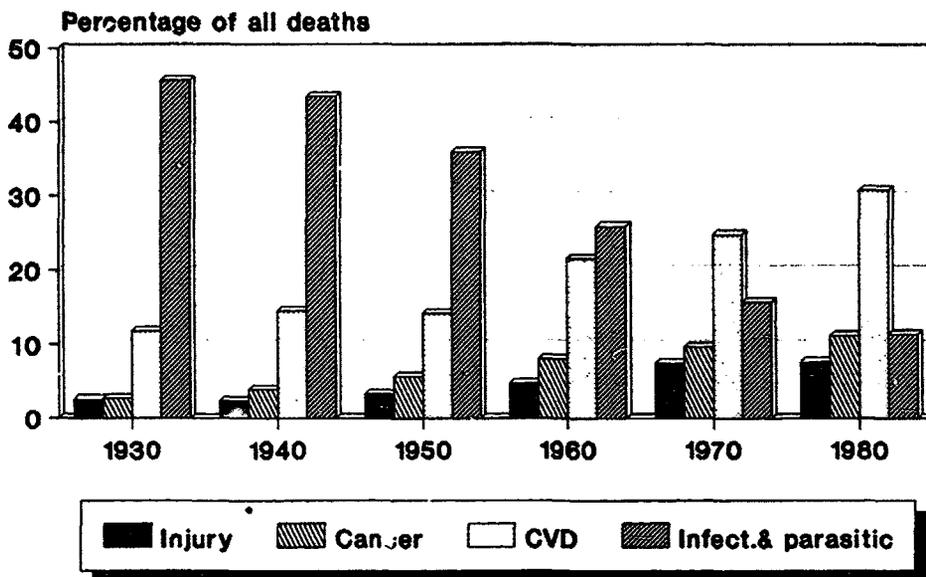
SOURCE:
Fischer &
Hofmeister, 1988

**Figure II-6:
Industrial Accidents in Brazil**



SOURCE: Nogueira, 1987

Figure II-7
Causes of Mortality in State Capitals,
1930-1980, uncorrected for age structure



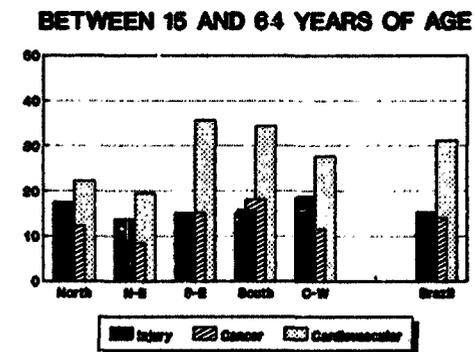
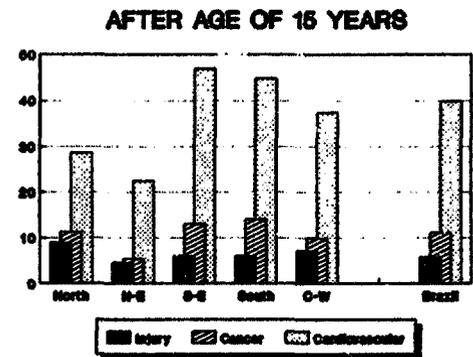
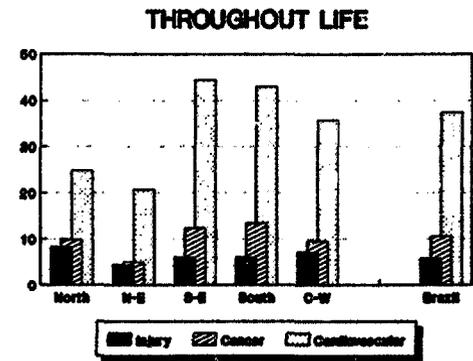
SOURCE: Bayer and de Goes, 1984

• excluding suicide and homicide

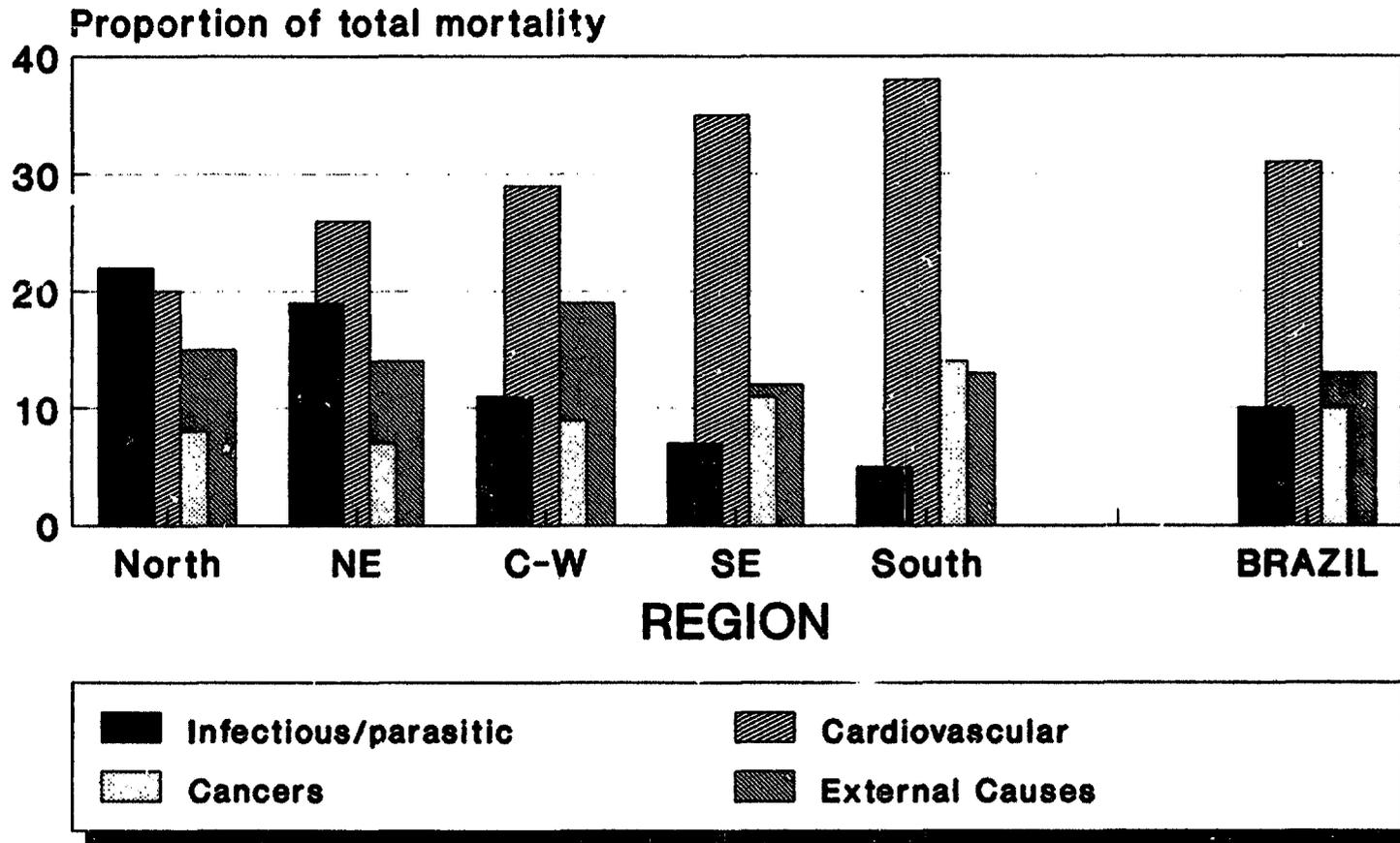
Figure II-8:

Of those who die, probability that the person will eventually die from an injury, cancer or cardiovascular disease

- (i) throughout life;
- (ii) after age fifteen
- (iii) between ages 15 and 64.



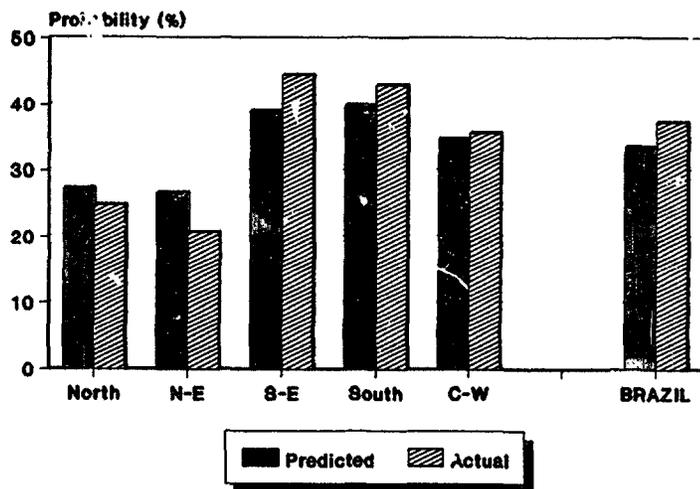
**Figure II-9:
Proportional Mortality
(Excluding undetermined causes)**



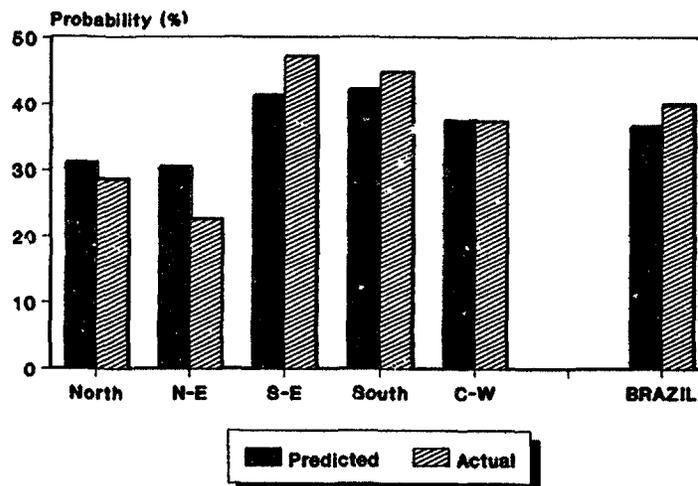
SOURCE: Ministry of Health, 1988

**Figure II-10:
Probability that a person will eventually die from
cardiovascular disease**

(i) AT BIRTH



(ii) AFTER AGE 15

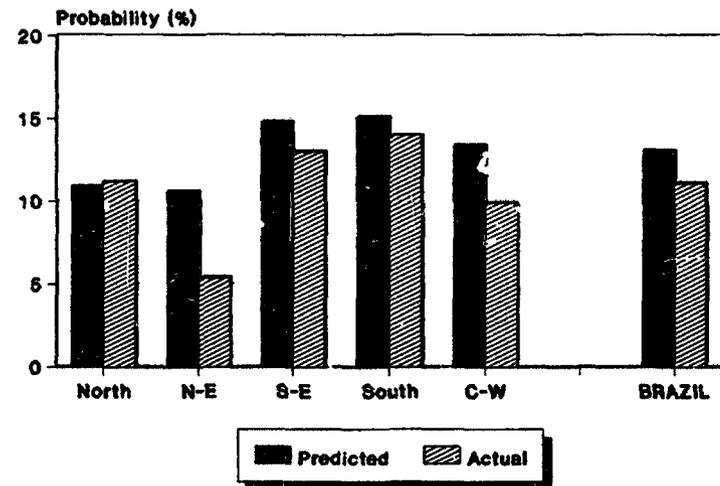
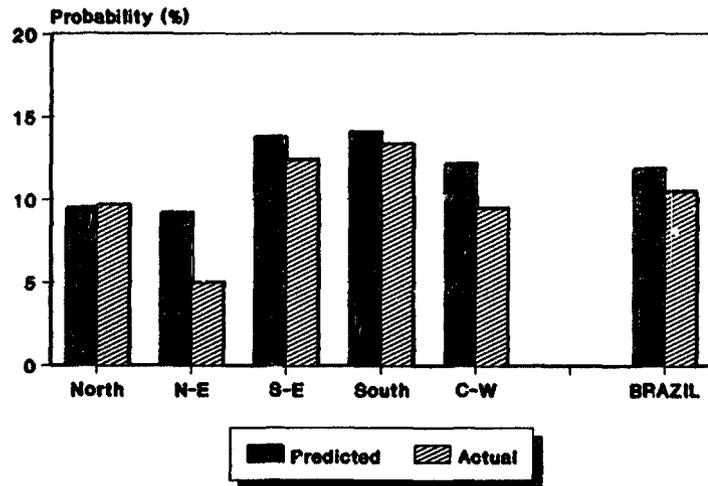


SOURCES: Prestion (1976) and World Bank analyses

Figure II-11:
Predicted and actual probabilities that a person
will eventually die from cancer

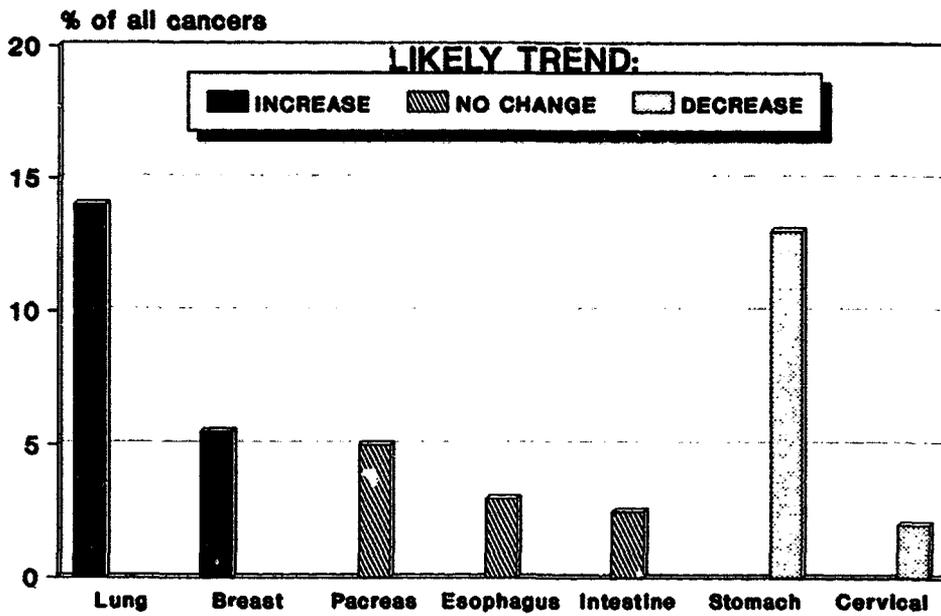
(i) AT BIRTH:

(ii) AT AGE 15:



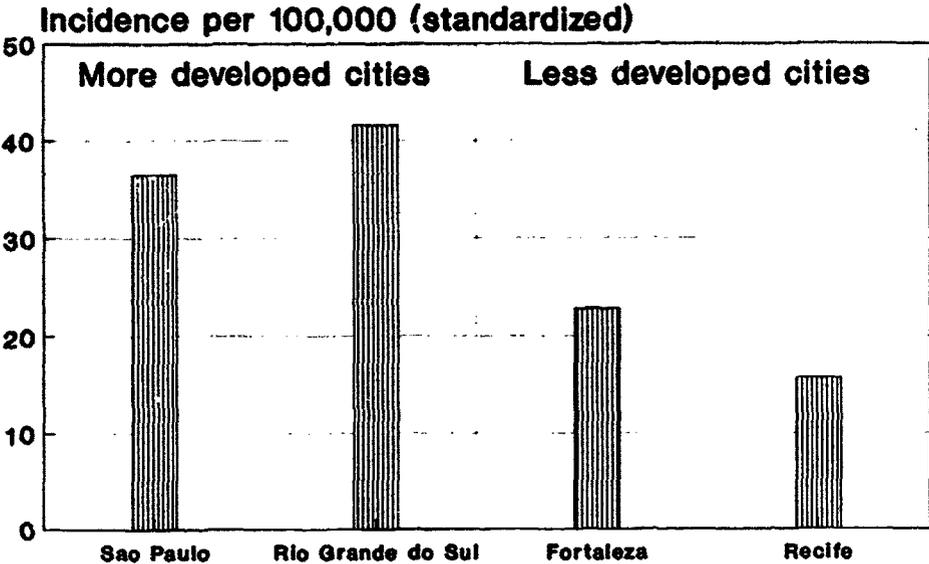
SOURCES: Preston (1976) and World Bank analyses

**Figure II-12:
Levels and likely trends in cancer death**



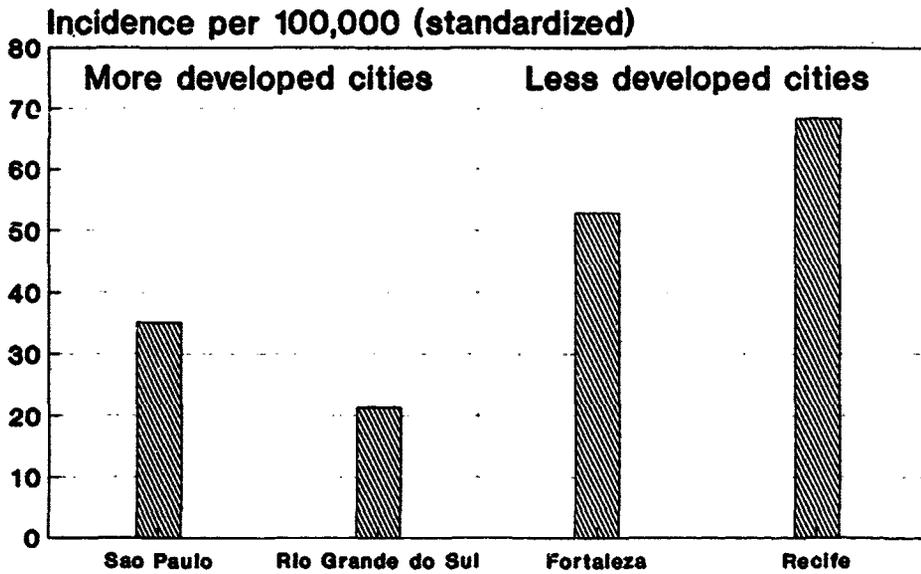
SOURCE: Ministerio da Saude, 1988

**Figure II-13:
Cancer and Level of Development:
I: Lung cancer among males**



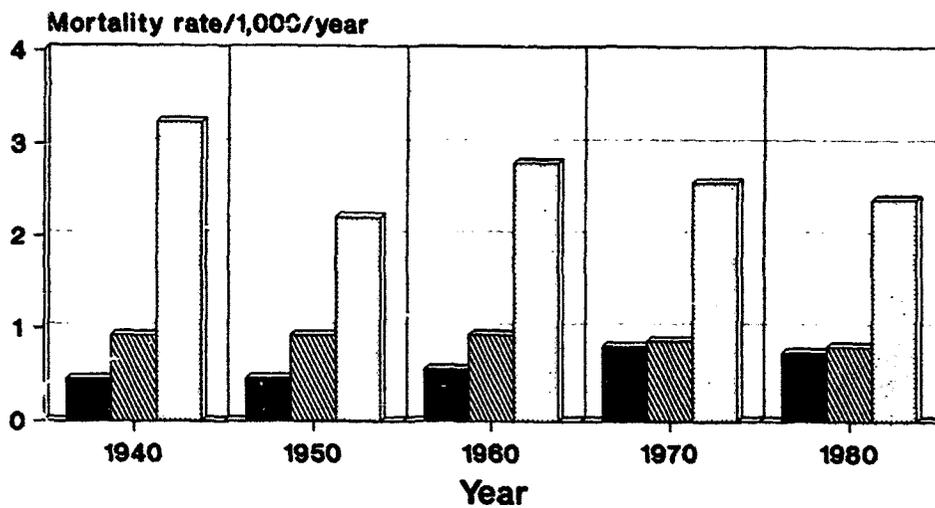
SOURCE: Faerstein, 1988

Figure II-14
Cancer and Level of Development:
II: Cervical cancer among females



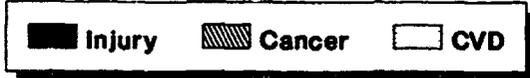
SOURCE: Faerstein, 1988

Figure II-15
Age-adjusted Mortality Rates, 1940-1980



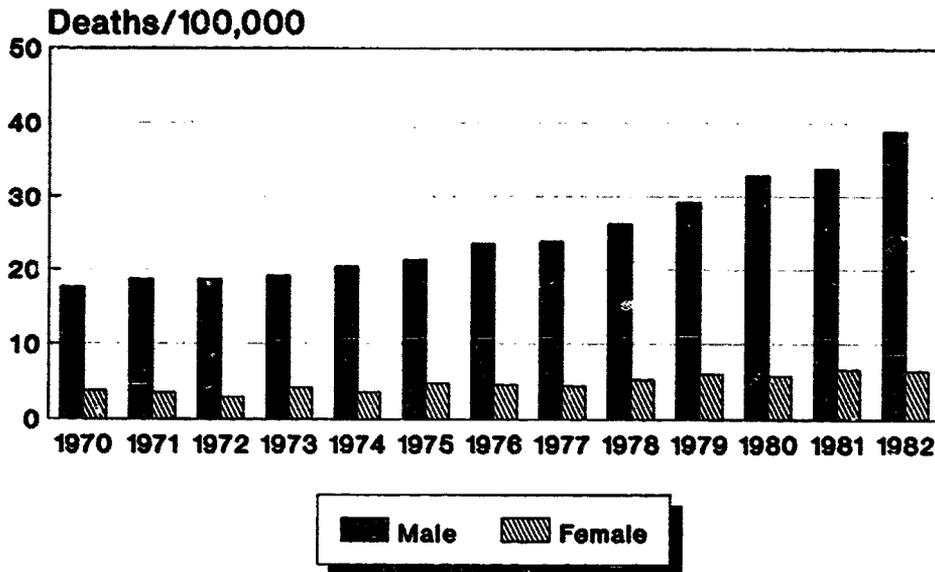
SOURCE:

World Bank analysis
of FIOCRUZ, 1987



Note: Rates standardized for 1980 age structure

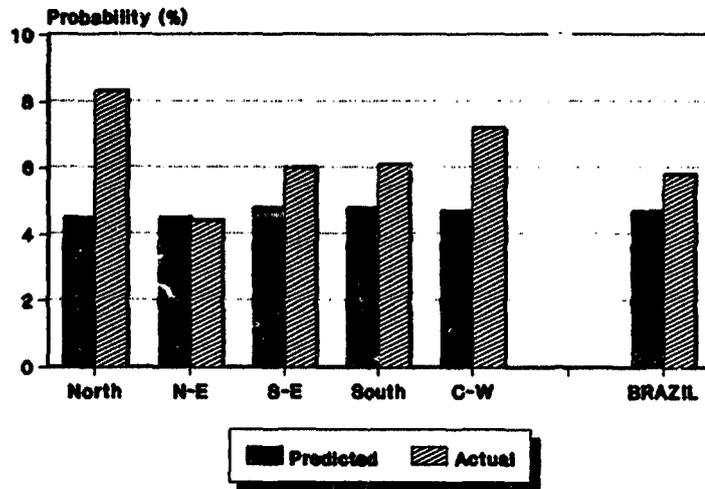
**Figure II-16:
Lung Cancer Death Rates in Rio Grande
do Sul (age standardized)**



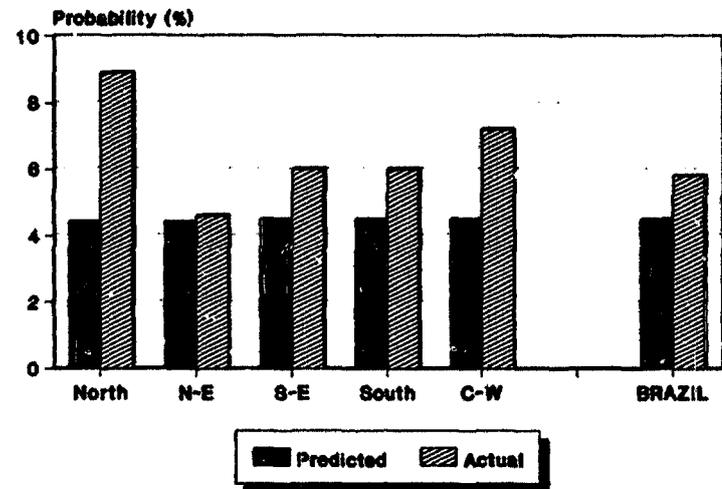
SOURCE: Prolla et al 1985

Figure II-17:
Probability that a person will eventually die from an injury

(i) AT BIRTH

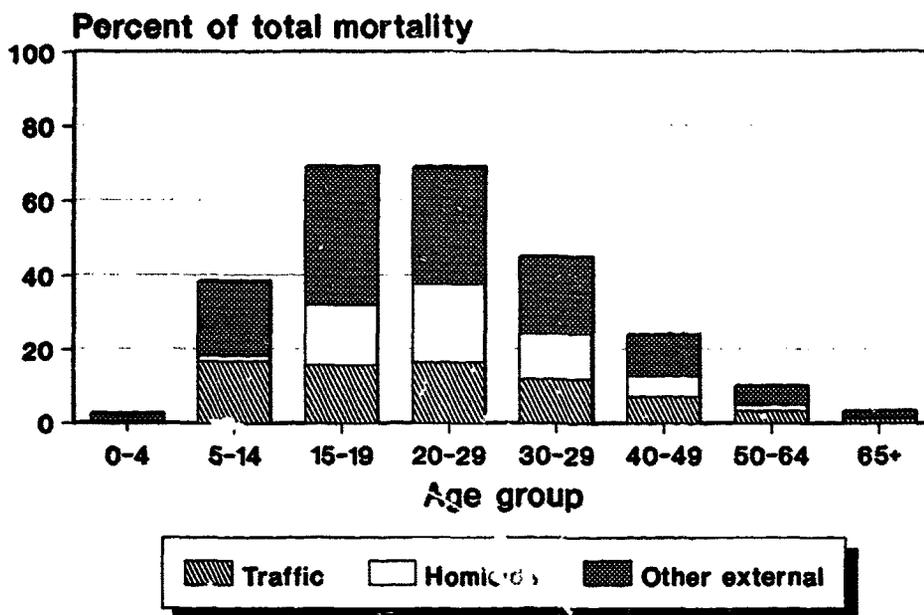


(ii) AFTER AGE 15



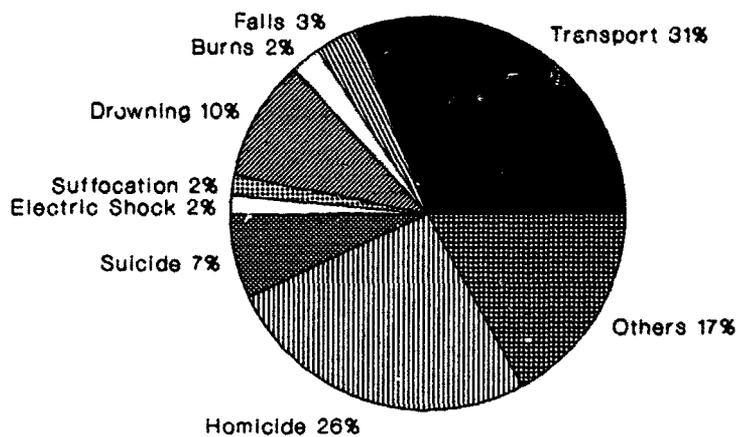
SOURCES: Preston (1976) and World bank analyses

Figure II-18
External Causes of Death by Age, Brazil



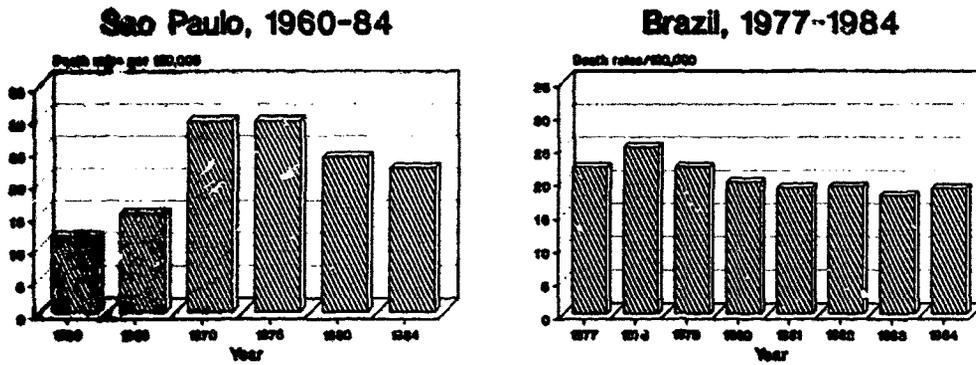
SOURCE: Szwarcaid and Castilho, 1985

**Figure II-19:
Major Causes of Injury Deaths, 1983
(excluding unknown causes)**



SOURCE: Ministerio da Saude, 1987

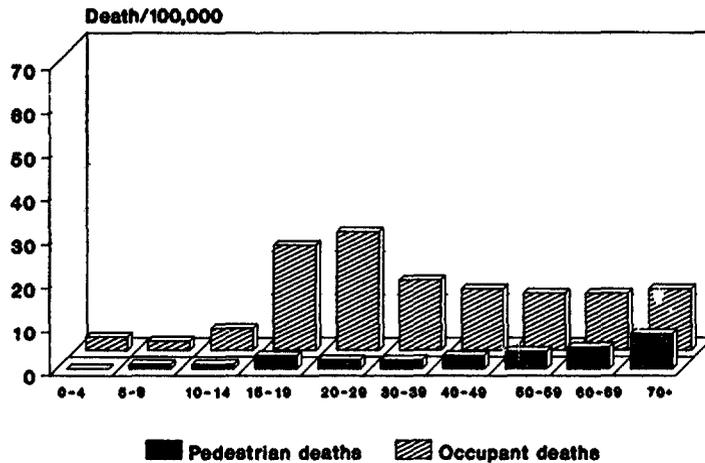
Figure II-20:
Traffic Accidents in Sao Paulo and Brazil



SOURCE: Mello Jorge, 1988

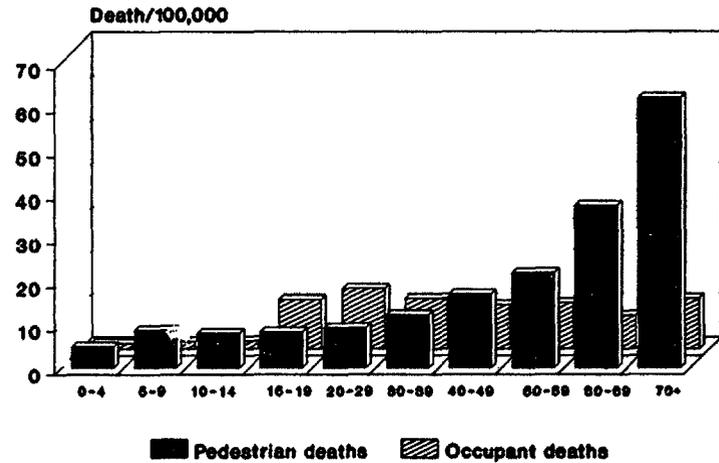
**Figure II-21:
Age-specific deaths from traffic accidents: US and Brazil:
Pedestrians and vehicle occupants**

UNITED STATES



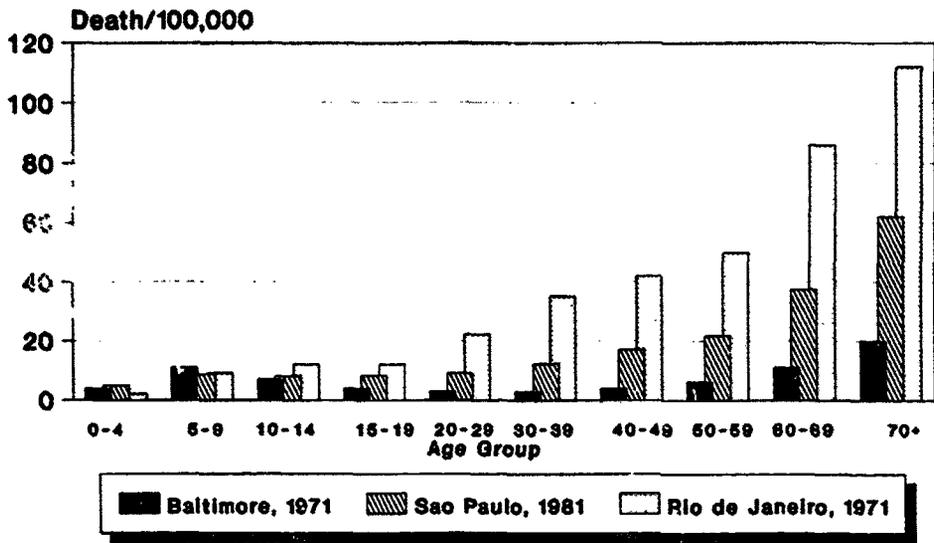
Source: Baker, 1984

BRAZIL (Sao Paulo City)



Source: Meilo Jorge, 1982

**Figure II-22:
Pedestrian Death Rates: Baltimore ('71),
Rio ('71) and Sao Paulo ('81)**

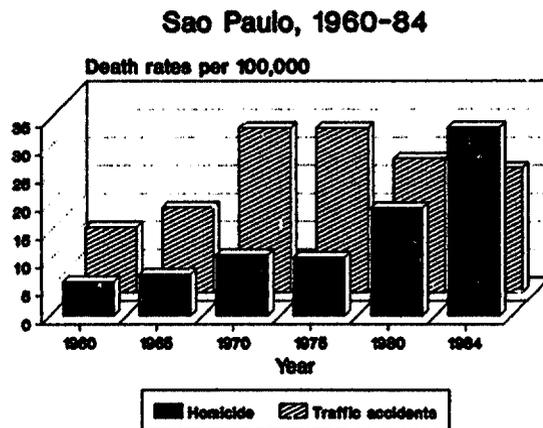


Source: Mello Jorge, 1982
Baker, 1977

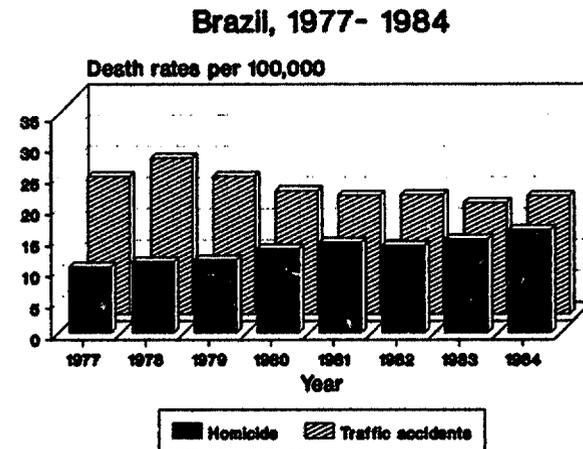
Note: In 1981 traffic accident death rates were similar
in Rio and Sao Paulo

Figure II-23:

Traffic accidents and homicide: Sao Paulo and Brazil

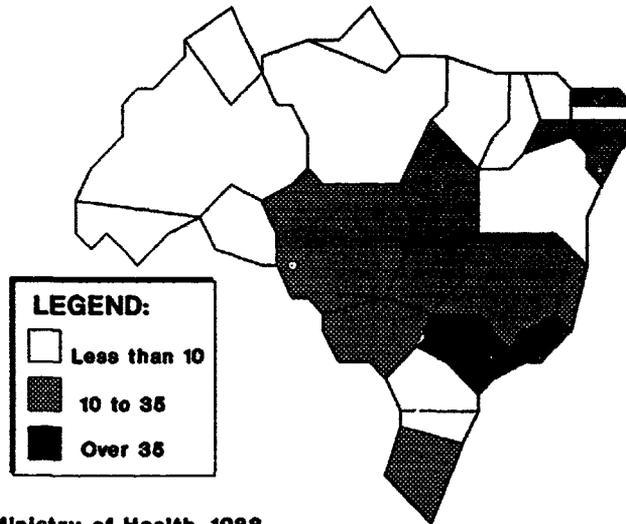


SOURCE: Mello Jorge, 1988



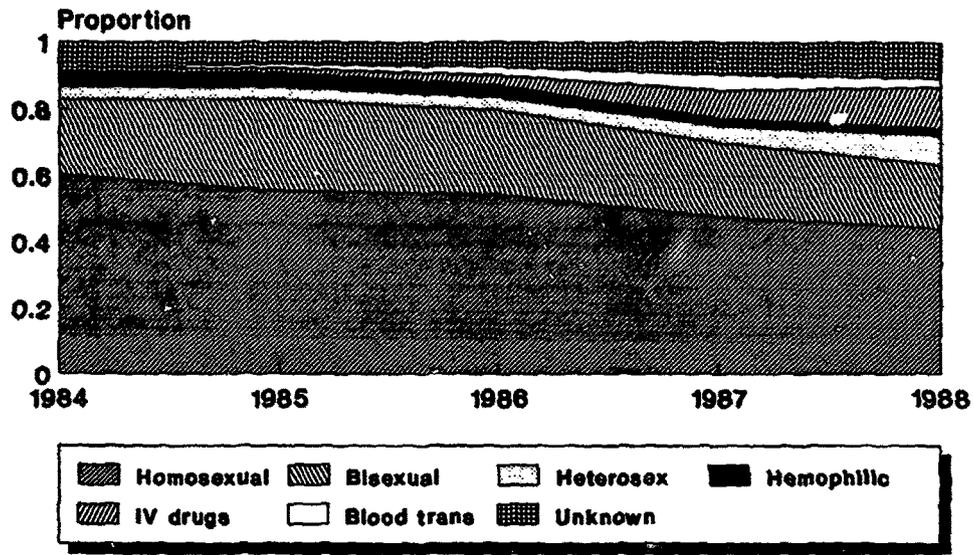
SOURCE: Mello Jorge, 1988

Figure II-24:
Cumulated Incidence of AIDS (per million)
October, 1988



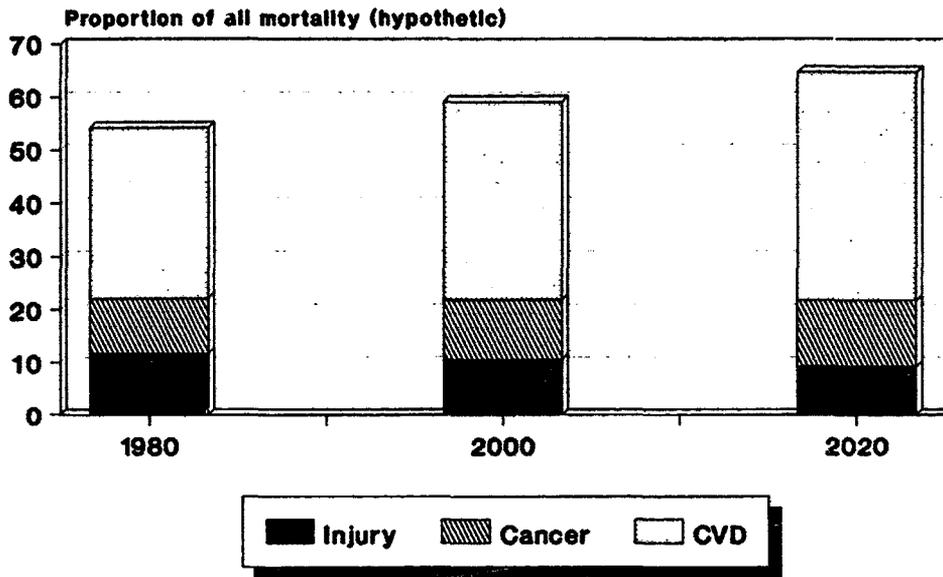
SOURCE: Ministry of Health, 1988

**Figure II-25:
Proportion of Male AIDS Cases
by Risk Factor**



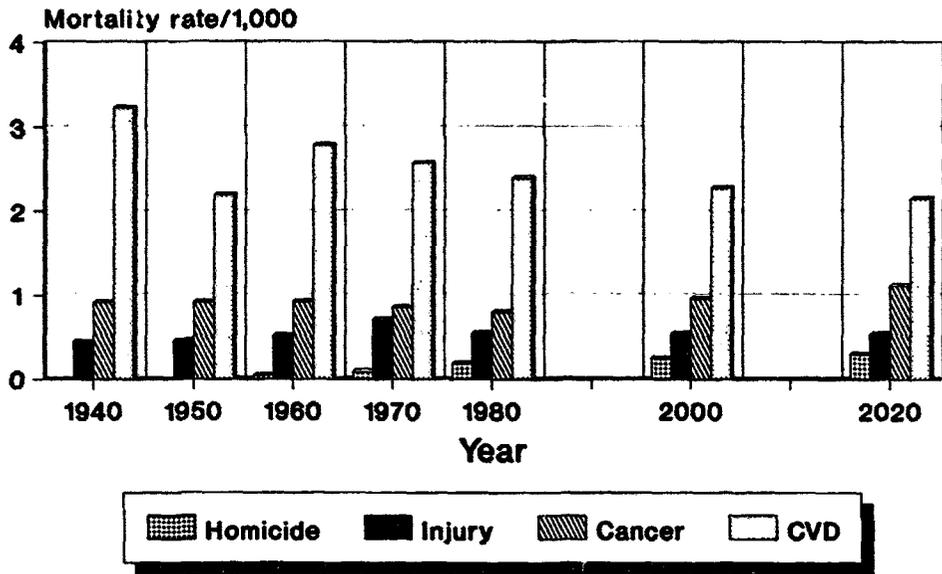
SOURCE: Castilho, 1989

Figure II-26
Effect of Age Structure Alone:
1980 rates applied to older populations



World Bank analysis

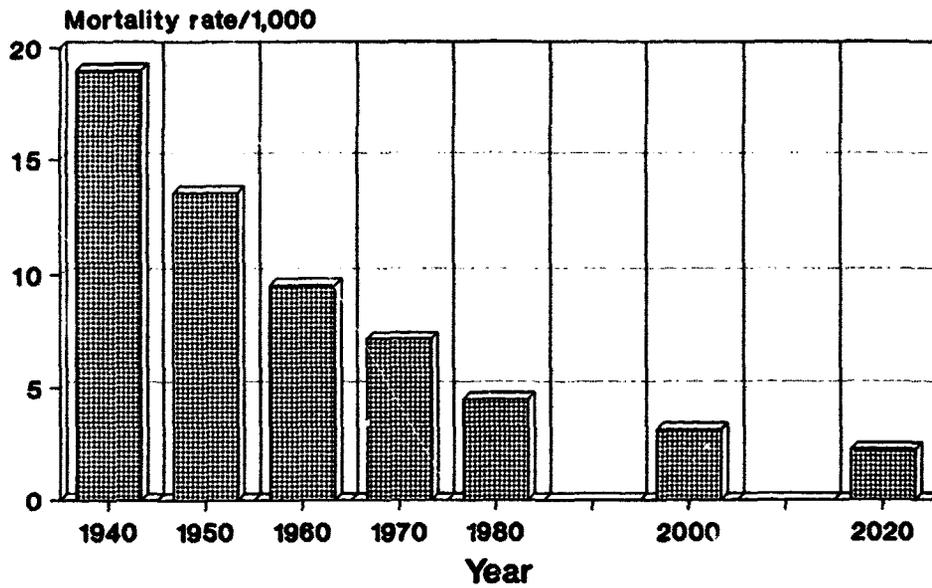
Figure II-27
Projections of age-adjusted
mortality rates



World Bank calculations

Note: Rates standardized for 1980 age structure

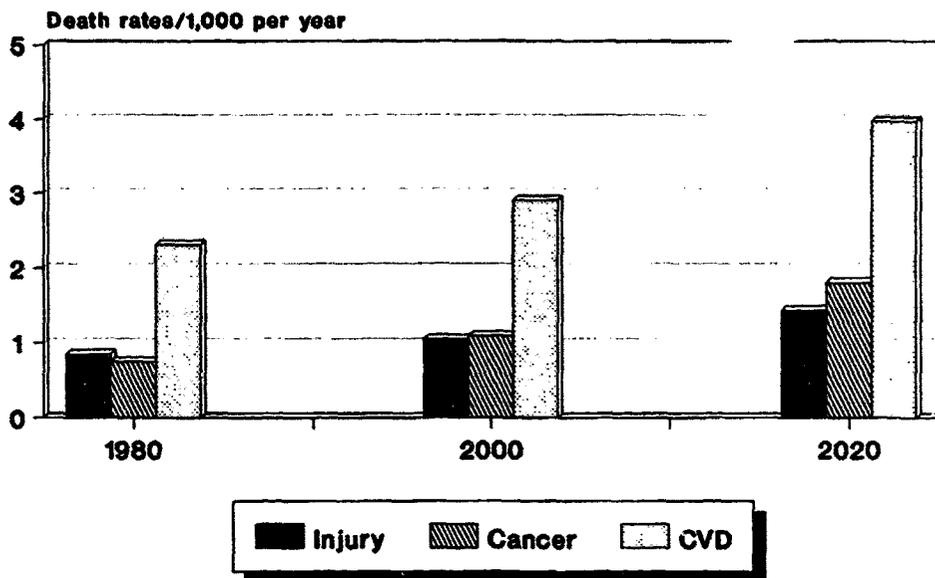
Figure II-28
Projections of age-adjusted
mortality rates for "other" causes



World Bank calculations

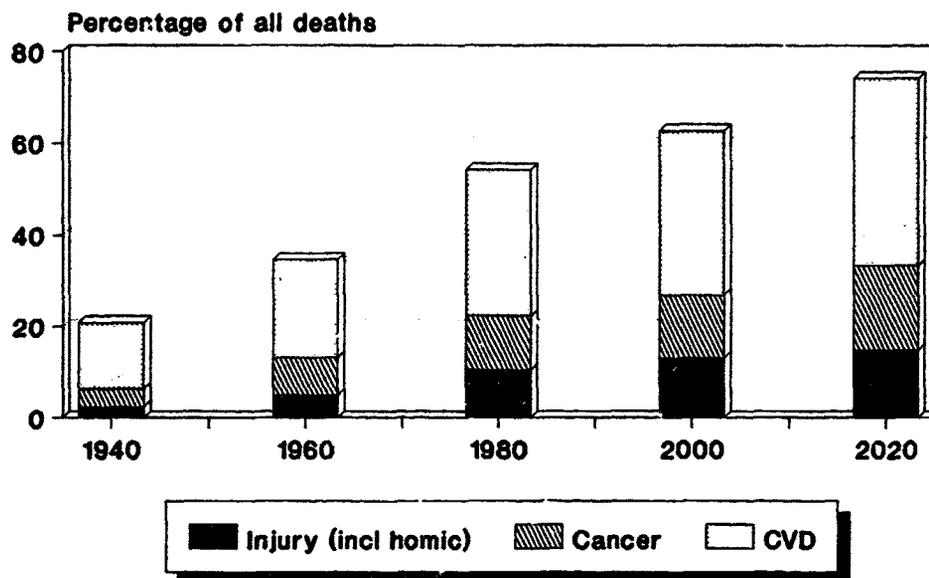
Note: Rates standardized for 1980 age structure

Figure II-29
Projected Crude Death Rates:
Cancer, Circulatory and Injury



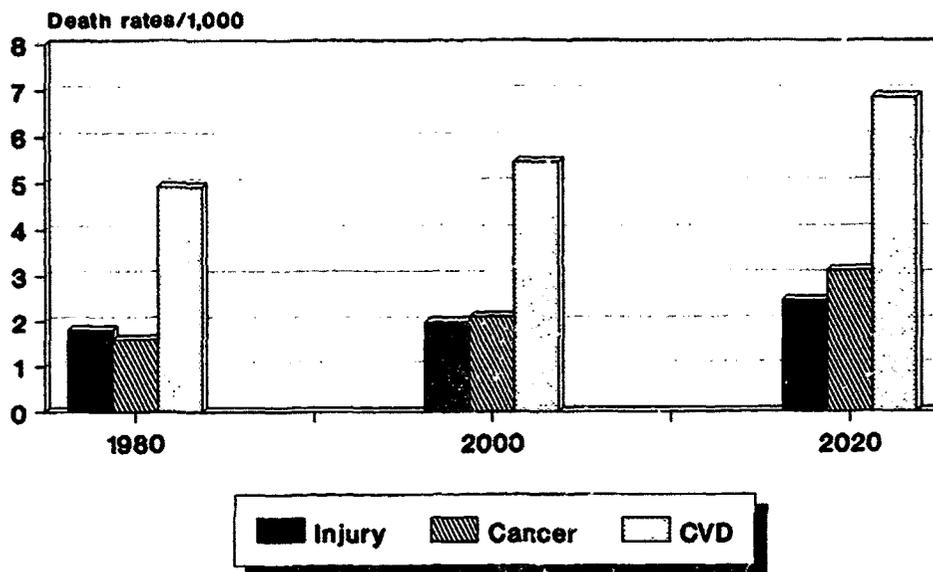
World Bank analysis

Figure II-30
Causes of Mortality:
Historic and Projected



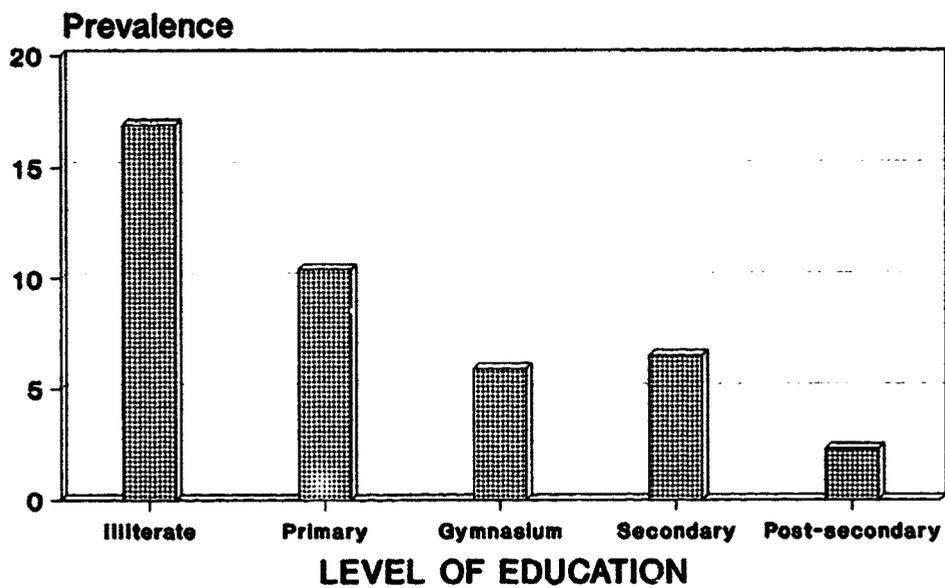
SOURCE: World Bank analysis

Figure II-31
Projected Death Rates per Worker:
Injury, Cancer & Cardiovascular Disease



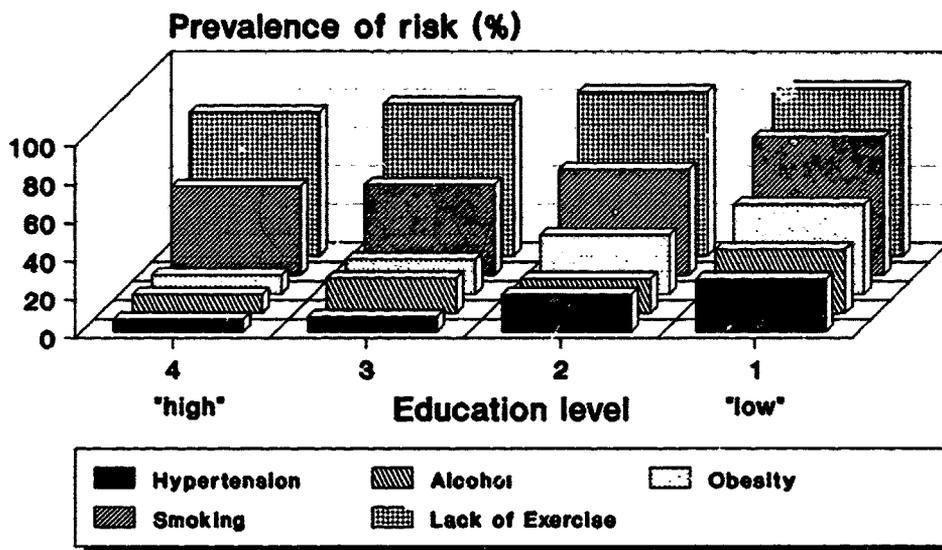
World Bank analysis

**Figure II-32:
Education and High Blood Pressure,
Adult Males, Volta Redonda, 1979/80**



SOURCE: Klein et al, 1985

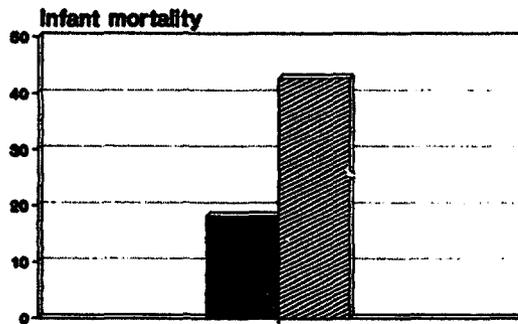
**Figure II-33:
Education and Risk Factors
Porto Alegre, 1987**



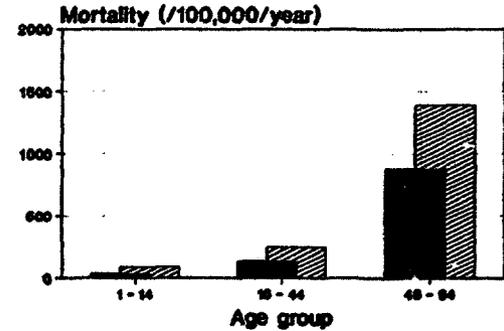
Source: Achutti et al., 1988

Figure II-34:

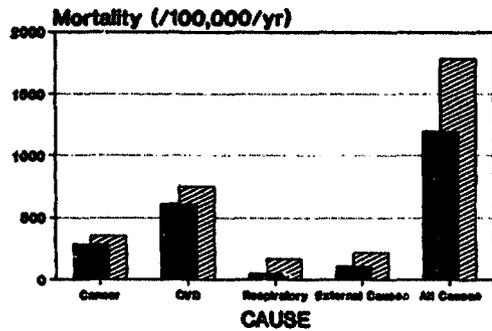
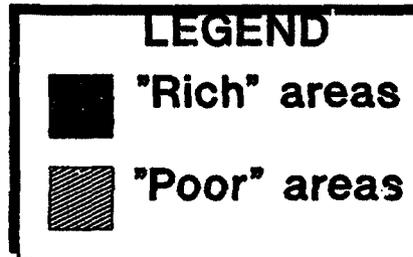
Class and mortality in Porto Alegre, 1980



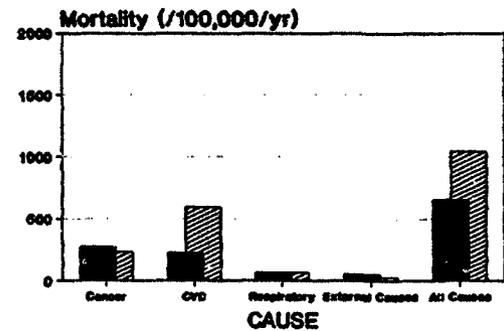
I: INFANT MORTALITY



II: ALL CAUSES, BY AGE



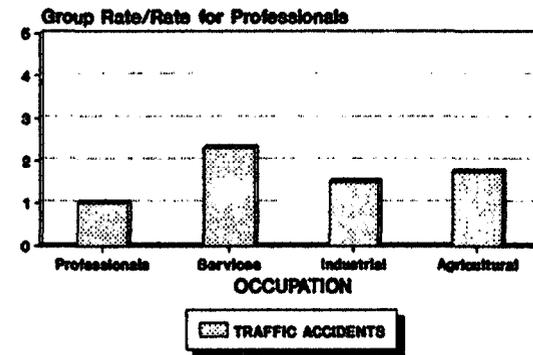
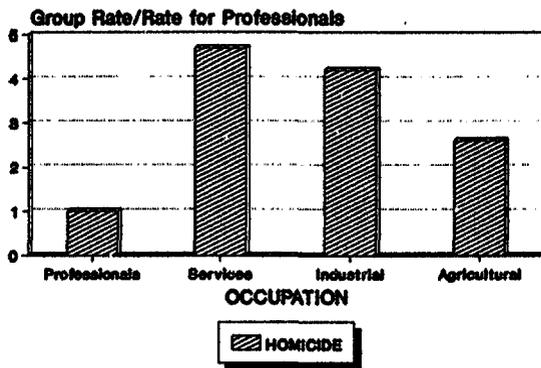
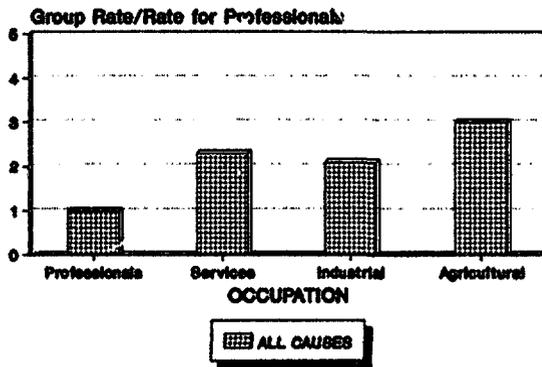
III: MALES, 45 - 64



IV: FEMALES, 45 - 64

SOURCE: Barcellos et.al., 1986

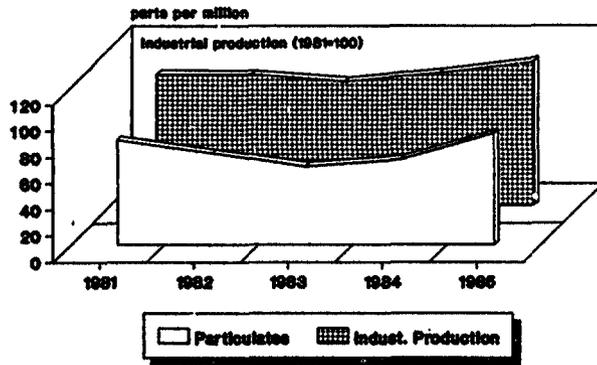
Figure II-35: Occupation and death, Sao Paulo State, 1980-1982



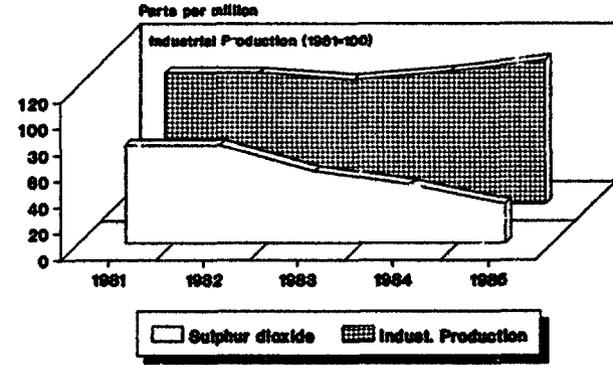
SOURCE: Rumel, 1987

Figure II-36: Air Pollution in Greater Sao Paulo, 1981-85

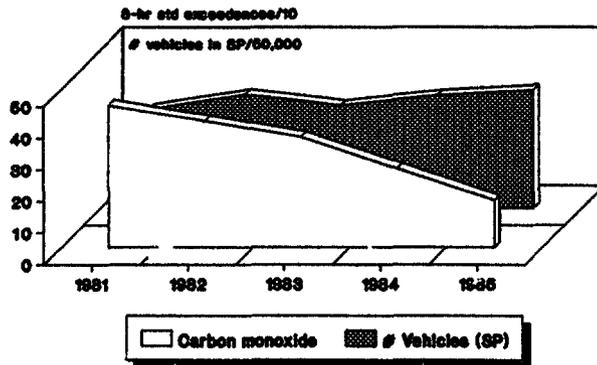
PARTICULATES:
Industry accounts for 60% of emissions



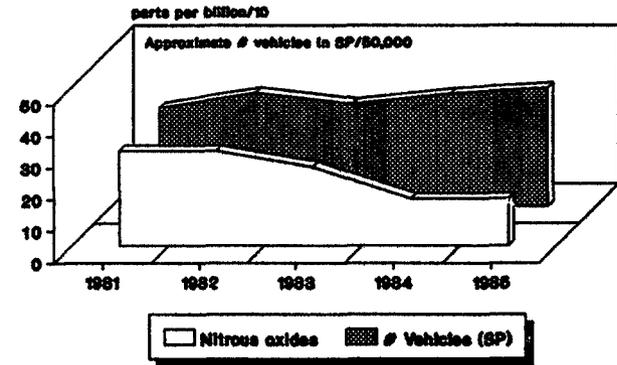
SULPHUR DIOXIDE
Power generation accounts for 75%



CARBON MONOXIDE
Vehicles account for 85% of emissions

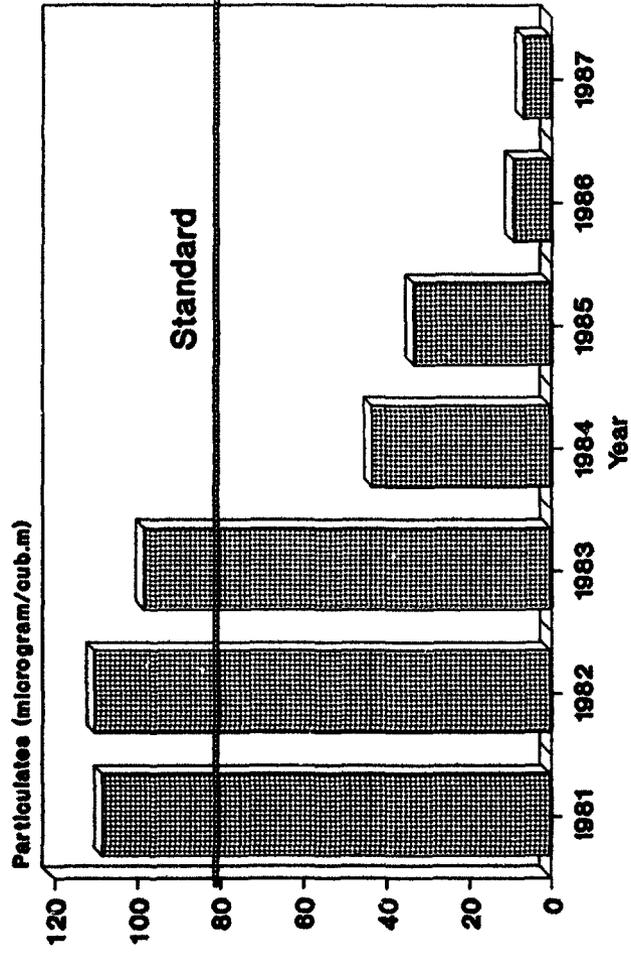


NITROUS OXIDES
Vehicles account for 90% of emissions



SOURCE: CETESB, 1987

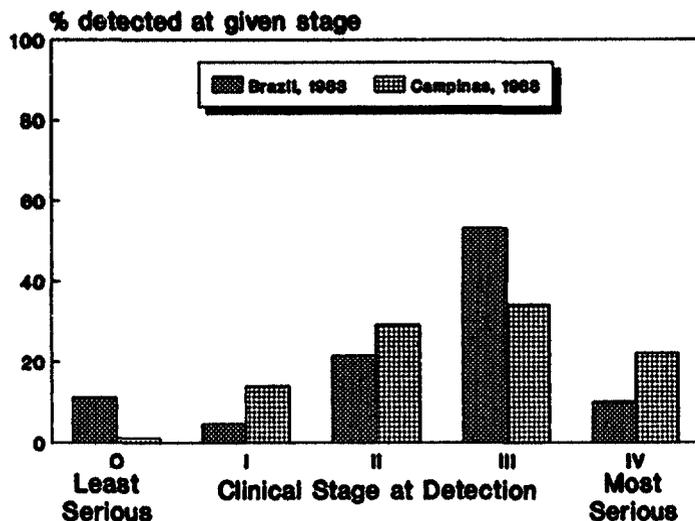
**Figure II-37:
Air Quality Improvements in Cubatao**



SOURCES: CETEB, 1986, 1987

Figure II-38: The Absence of a National Cervical Cancer Program, and the Effects of the Campinas Program

BEFORE AN EARLY DETECTION PROGRAM



AFTER AN EARLY DETECTION PROGRAM

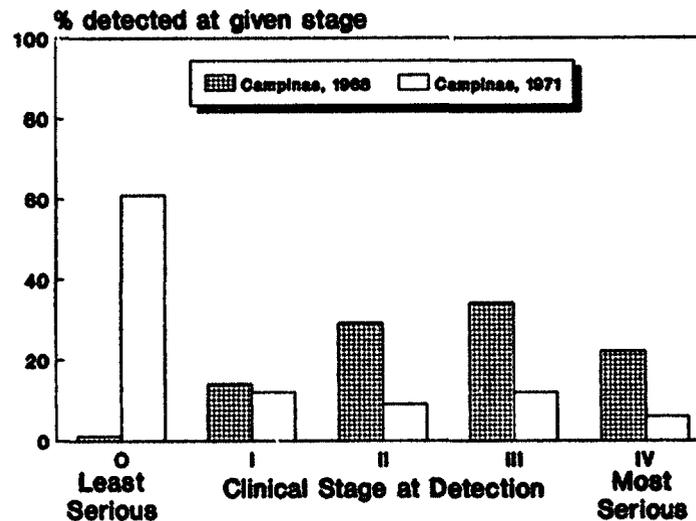
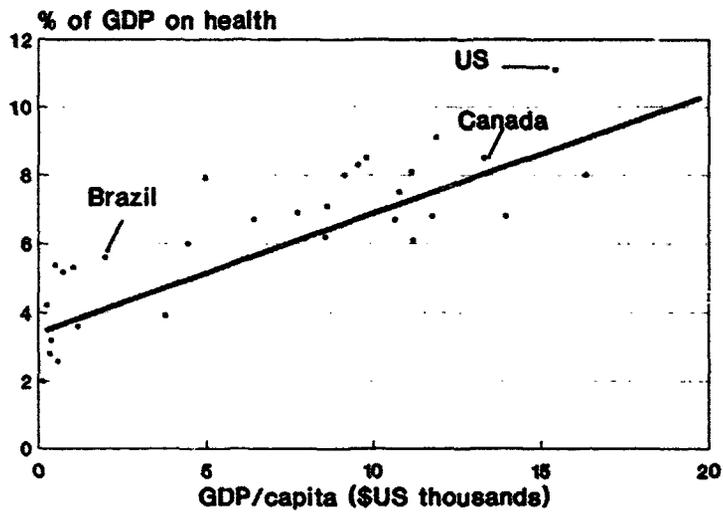
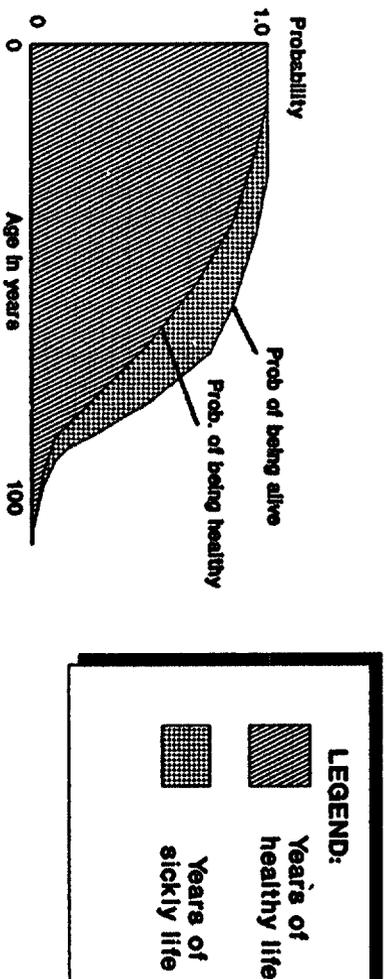


Figure III-1:
Total Health Expenditures in the OECD,
Some Developing Countries, and the Americas



SOURCES: OECD and World Bank data

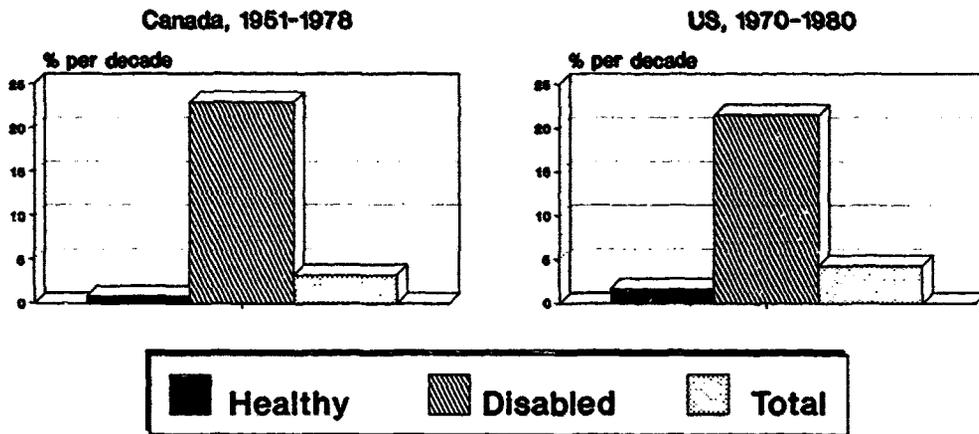
Figure III-2:
Morbidity and mortality curves for a population



Source: WHO, 1984

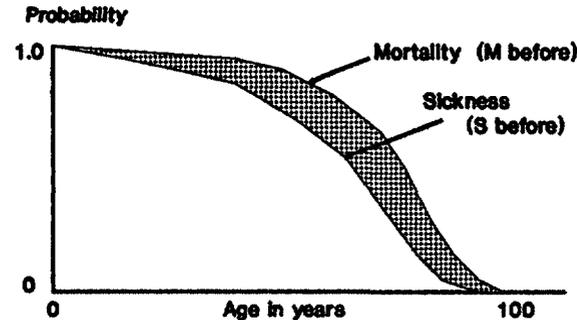
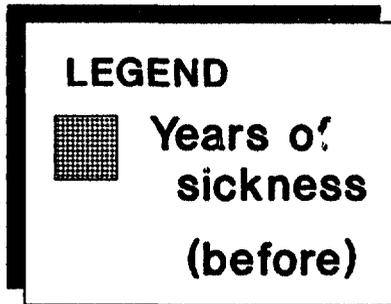
Figure II-3:

Increases in healthy, disabled and total years of life Canada and the United States



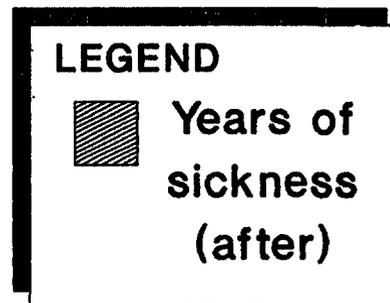
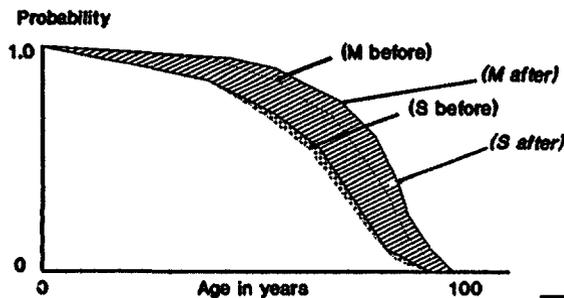
SOURCES: Wilkins and Adams, 1987, & Crimmins, 1988

Figure III-4: Hypothetical effects of case management and prevention on years of sick life BEFORE INTERVENTION:

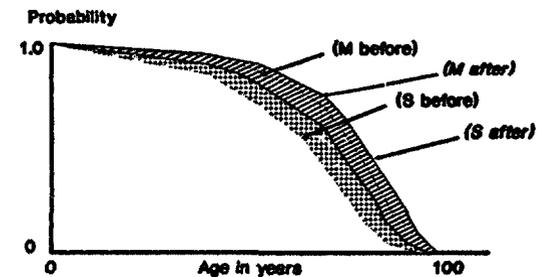


AFTER INTERVENTIONS WHICH HAVE SAME EFFECT ON MORTALITY:

(a) Case Management



(b) Prevention

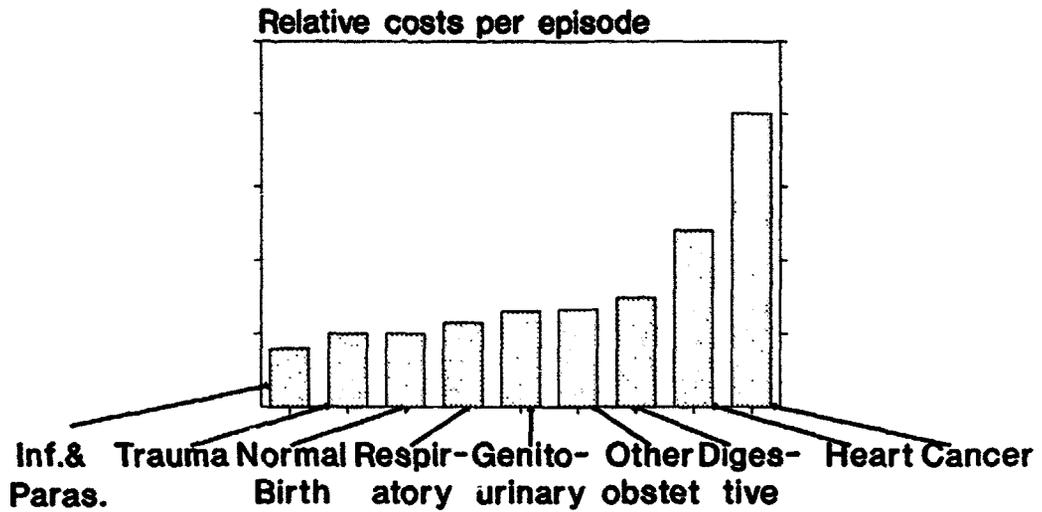


Effect on years of sickness:
Large increase

Little change (+ or -)

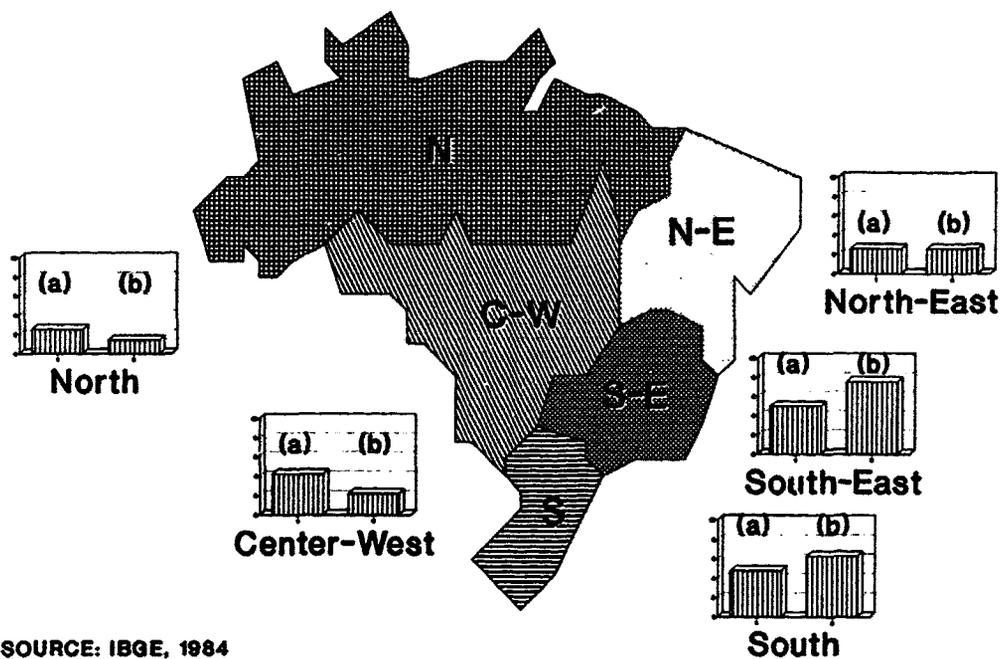
Figure III-5:

**Unit costs of hospitalization due to
different conditions**



SOURCES: Hartunian, 1980; Campos, 1988

Figure III-6:
Distribution of health facilities:
(a) Beds/1000 people & (b) general outpatient facilities/ million



SOURCE: IBGE, 1984

**Figure III-7:
Schematic representation of the financing
and provision of health services in Brazil**

PROVIDERS:

FINANCERS:

Spending
(% GDP)

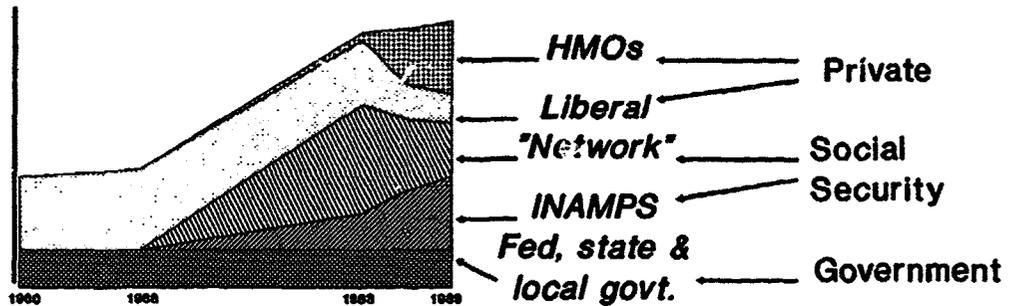
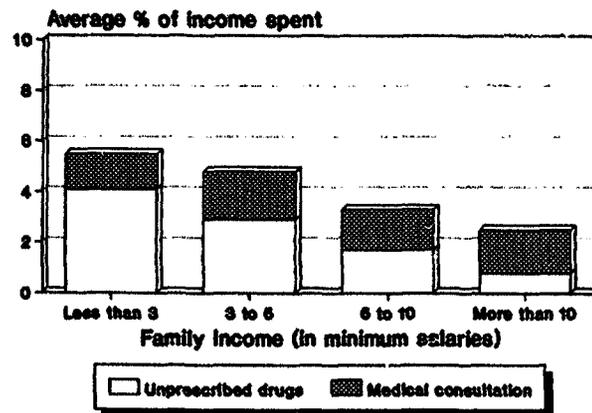
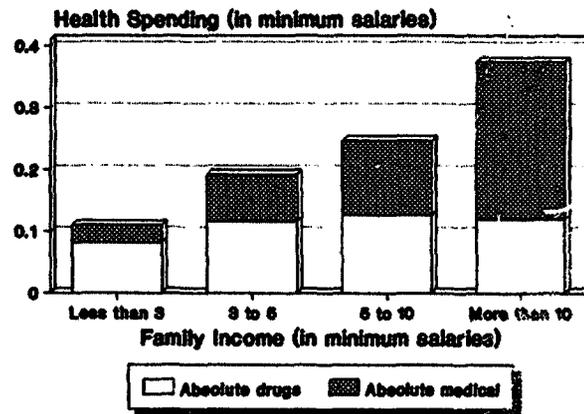


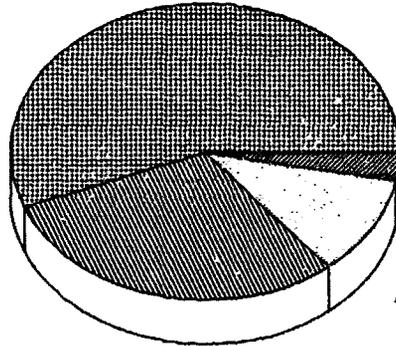
Figure III-8: Out-of-pocket Expenditures for Health by Income Group, Brazil, 1981



Source:
World Bank calculations
based on IBGE, PNAD, 1981

**Figure III-9:
Shares of the Group Health Plan Market**

Group medicine 56%



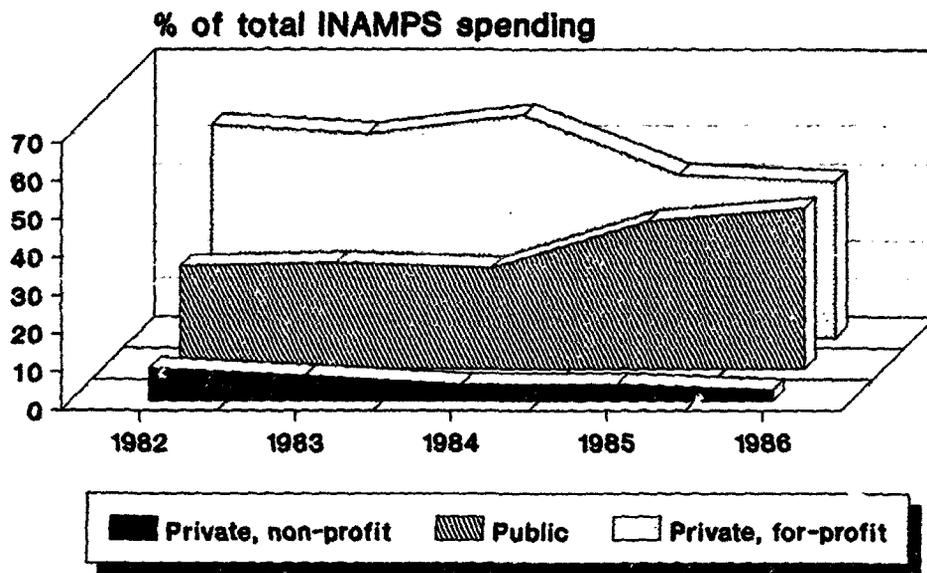
Insurance 3%

Autoprogram 11%

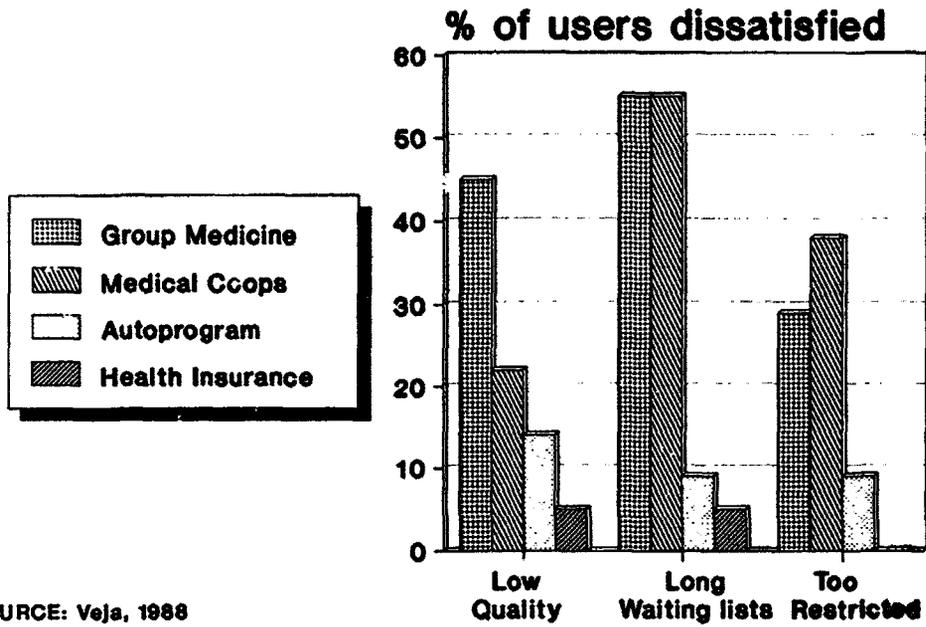
Medical Coops 30%

SOURCE: Veja, 1988

**Figure III-10:
INAMPS payments to different health
providers, 1982-1986**

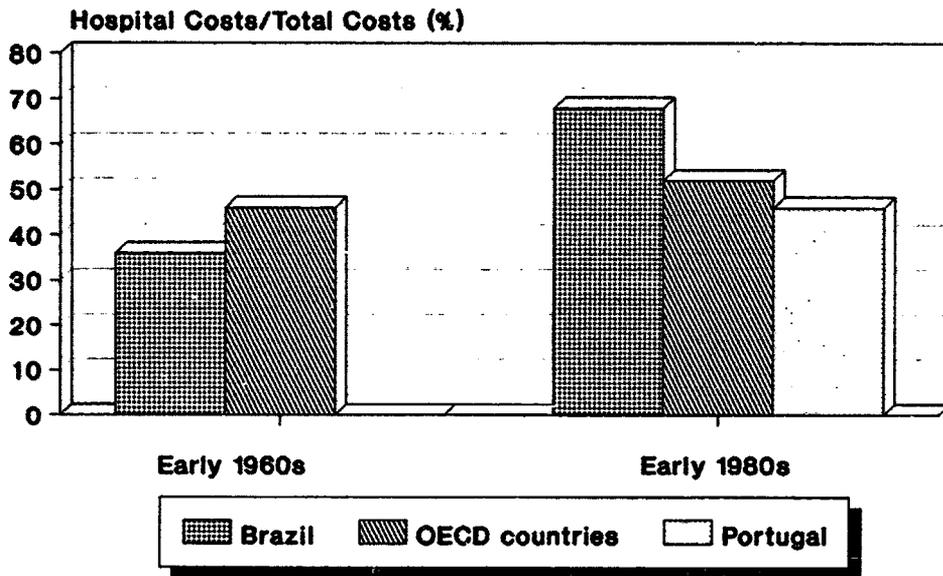


**Figure III-11:
Users' perceptions of the quality
of group health plans**



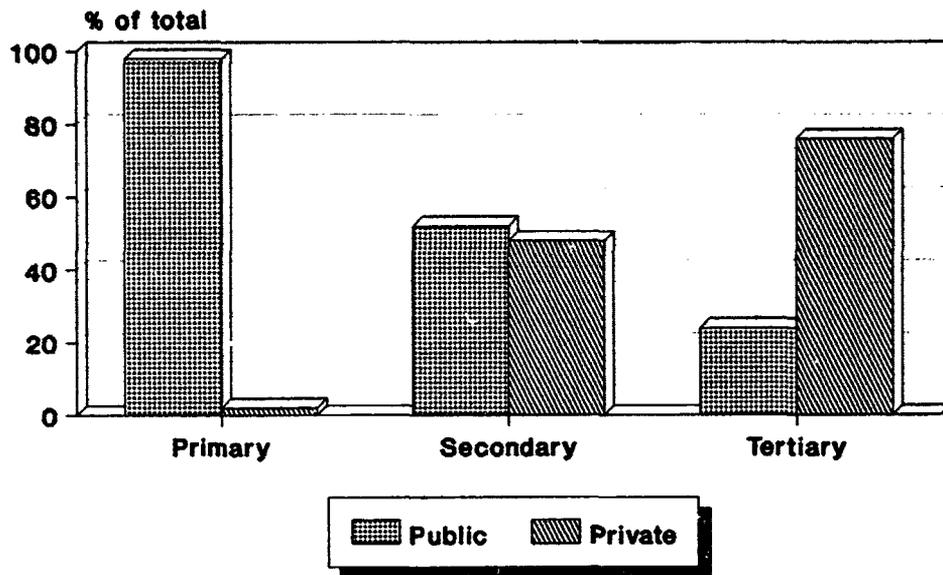
SOURCE: Veja, 1988

**Figure III-12:
Expenditure on hospitals in
Brazil and OECD**



SOURCE: Campos, 1988

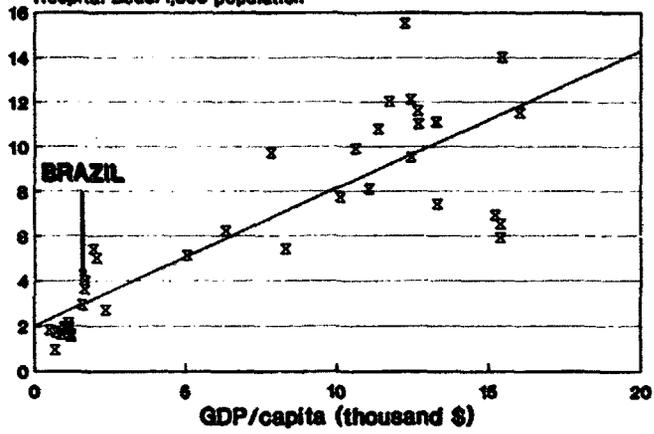
Figure III-13
Public and Private Shares
of Health Facilities



SOURCE: Souza e Silva, 1988

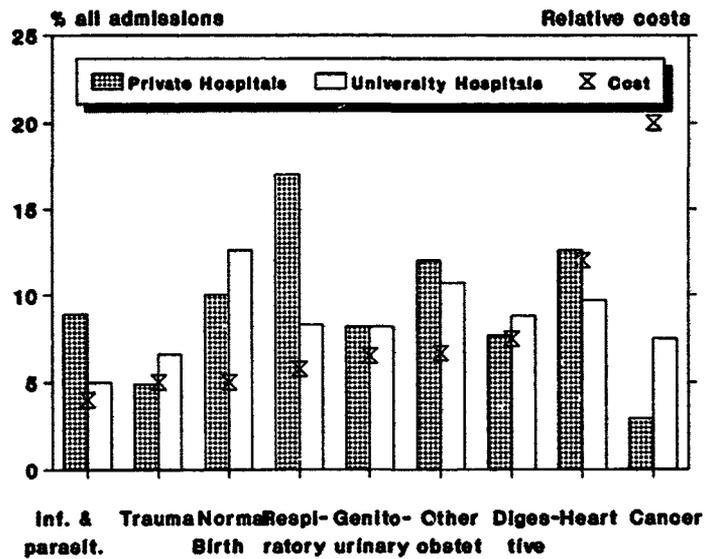
Figure III-14:

Hospital beds per person in OECD and Latin America
Hospital Beds/1,000 population



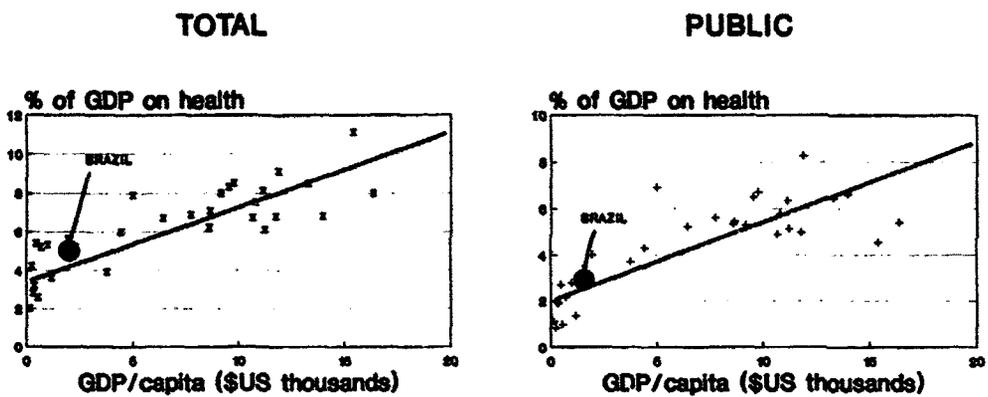
BEDS PER CAPITA IN BRAZIL:
Predicted = 3.0
Actual = 4.0

**Figure III-15:
Hospital admission patterns in INAMPS-funded
Private and University Hospitals**



SOURCES: Cordeiro, 1988; Campos, 1988; INAMPS, 1989

Figure III-16:
Relationship between GDP/capita and health expenditure
in OECD countries and 8 developing countries



SOURCES: OECD and World Bank data

BIBLIOGRAPHY

BIBLIOGRAPHY

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NOTES

MAP SECTION

