“Diabesity: Potentially the Greatest Epidemic in World History”

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Studies in Migrating Populations

• Opportunity to study the genetic and environmental determinants of disease in different ethnic groups in same & different locations
• Demographic issues
• Nutrition
• Physical activity
• Socio-cultural issues
• Climatic & pollution issues
• Epigenetic determinants
The United Nations today launched an all-out attack on non-communicable diseases (NCDs) such as cancer and diabetes with a summit meeting devoted to curbing the factors, like tobacco and alcohol use, behind the often preventable scourge that causes 63 per cent of all deaths.
Obesity is driving the escalating Diabesity epidemic: The biggest epidemic in human history

Past and projected future overweight rates in selected OECD countries

- USA
- England
- Canada
- Spain
- Austria
- Australia
- France
- Italy
- Korea

Proportion overweight

Years

Global Projections for the Diabetes Epidemic: 2010-2030 (millions)

World
2010 = 285 million
2030 = 438 million
Increase 54%

2011 - a staggering 366 million
2030 – 552 million

Modernization & High Diabetes Prevalence 1966-1975

Phoenix Arizona: Pima Indians

Pacific – Nauru

Australia: Indigenous

New Zealand: Maori
The 10 Top Nations for Diabetes Prevalence: 2010

- Malaysia
- Tonga
- Oman
- Kuwait
- Réunion
- Bahrain
- Mauritius
- Saudi Arabia
- UAE
- Nauru

* For 20-79 year population
Western Killer in Paradise
“The Age”, May 1992

A Western killer let loose in paradise

PARADISE — also known as the South Pacific — has palm trees, white beaches, smiling black islanders, peace, pleasure, and no tomorrow. But there will be a tomorrow, and it’s coming. In the past 10 years, many of those smiling people have at their feet, gone blind, become obese, got heart disease and many kinds of cancers, and have died prematurely.

Diabetes, possibly the greatest hidden killer in the world, has hit the South Pacific. Professor Paul Zimmet, director of the Asia International Diabetes Institute in Melbourne, known as the “Captain Cook of diabetes,” travels the Pacific treating and teaching islanders about one of their most common illnesses. ANNA KING MURCHIE reports.

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started to set high rates of diabetes, and that agenda until the coup, when a lot of doctors left the country.”

Ten years ago, the Lions International Diabetes Institute became the first World Health Organisation Collaborating Centre for Diabetes. “We’re still the only one in the Southern Hemisphere, but there are about 20 now in the Northern Hemisphere.”

The institute, which is Paul Zimmet’s major achievement, nearly closed down its research activities at the end of last year because of lack of funds. For 13 years it had received money from the National Institute of Health in Washington, but last year the supply stopped as American research funds stopped.

Professor Paul Zimmet: “...heading for a global epidemic of diabetes.”
Diabetes Numbers:
10 Highest Countries 2010

China now has over 90 million people with diabetes*

# Diabetes Atlas, 3rd edition, IDF 2006
* Yang W et al NEJM April 2010
Mauritius therefore became: “the epitome of the struggle between free labour and slavery and the test scene for the success of renewed Coolie immigration.”

I. M. Cumpston, Indians Overseas in British Territories, 1834-1854. Published 1969
Mauritius: Where it all started with the end of slavery

“As the first colony to undertake a Government regulated importation of indentured labour, Mauritius served as a model for the Caribbean, Fiji, South Africa and other territories which subsequently had recourse to Indian immigrants for the purposes of plantation production.”

S. Deerpalsingh and M. Carter
Selected Documents on Indian Immigration Mauritius, 1834-1926 Mahatma Gandhi Institute 1994
Mauritius: The Next Step in Predicting the Global Diabesity Epidemic

- The population consists of Asian Indians, Blacks (Creoles) and Chinese
- These 3 ethnic groups constitute 66% of the world’s population
62% increase from 1987 to 2009

Mauritius: Increase in Diabetes Prevalence over 22 yrs

Standardised to 2008 population structure of Mauritius
Increasing Diabetes Prevalence 1980-2009: China

Life style changes

Ji Linong: Personal communication
Coca-colonization in Jaipur, India
India increasingly crippled by 'the sugar disease'

By N.R. Kleinfield

MADRAS, India: There are many ways to understand diabetes in this choking city of automakers and software companies, where the disease seems as commonplace as sausages.

One way is through the story of P. Ganam, 50, a proper woman reduced to take gold.

Her husband, K. Palsaram, had diabetes do its erosive job on him. Ulcers bore into both feet and cost him a leg.

To pay for his care in a country where health insurance is rare, Ganam sold all her cherished jewelry. Gold, as she saw it, swapped for life.

She was asked about the necklaces and bracelets she was now wearing — worthless impostors, as it turned out.

"Diabetes," she said, "has the gold."

And now, Ganam, the scaffolding of her hard-won middle-class existence already undone, has diabetes too.

In its latest, most daunting manner, Type 2 diabetes is engulfing India, swallowing up the legs and jewels of those comfortable enough to put on weight in a country better known for famine.

Once, juxtaposed alongside the stick-thin poverty, the malaria and the AIDS, the number of diabetics now totals around 50 million, and counting.

The future looks only more ominous as India hurtles into the present, modernizing and urbanizing. Even more of its 1.1 billion people seem destined to become heavier and more vulnerable to Type 2 diabetes, a disease of high blood sugar brought on by obesity, inactivity and genetics, often culminating in blindness, amputations and heart attacks.

In 20 years, projections are that there may be a staggering 75 million Indian diabetics.

"Diabetes, unfortunately, is the price you pay for progress," said Dr. A. Ramachandran, managing director of the M.V. Hospital for Diabetes in Madras.

For decades, Type 2 diabetes has been the "rich man's burden," a problem for industrialized countries to solve. But as the sugar disease, as it is often called, has penetrated the United States and other developed nations, it has also trespassed deep into the far more populous developing world.

In Italy or Germany or Japan, diabetes is on the rise. In Bahrain and Cambodia and Mexico — where industrialization and Western food habits have taken hold — it is rising even faster. For the world has now reached the point, according to the United Nations, where more people are over-weight than undernourished.

Diabetes does not just convey the ghastly despair of AIDS or other killers. But more people worldwide now die from chronic diseases like diabetes than from communicable diseases. And the World Health Organization expects that of the more than 350 million diabetes projected in 2025, three-fourths will inhabit the third world.

"I'm concerned for virtually every country where there's modernization going on, because of the diabetes that follows," said Dr. Paul Zimmet, director of the International Diabetes Institute in Melbourne, Australia. "I'm fearful of the resources ever being available to address it."

India and China are already home to more diabetics than any other country. Prevalence among adults in India is estimated at about 6 percent — two-thirds of that in the United States — but the illness is traveling faster, particularly in the country's large cities.

Throughout the world, Type 2 diabetes, once predominantly a disease of the old, has been striking younger people.

But because Indians have such a pronounced genetic vulnerability to the disease, they tend to contract it 10 years earlier than people in developed countries. It is because India is so youthful — its population is under 25 for 30 years — that the future of diabetes here is so chilling.

The conventional way to see India is to inspect the waist — for food, for money, for life. The 200 million who struggle below the poverty line. The millions of children with too little to eat.

But there is another way to see it through its newfound excesses and expanding middle and upper classes. In a changing India, it seems to go this way: Make good money and get cars, get houses, get pets, get diabetes.

Obesity and diabetes stand almost as joint totems of success. Last year, in fact, the M.V. fast-food and ice cream restaurant in Madras proclaimed a promotion: "Overweight? Congratulations."

The limited-time deal afforded diners savings equal to 50 percent of their weight in kilograms. The heaviest arrival lugged in 147 kilograms, or 297 pounds, an assist by at 65 percent off.

Too much food has pernicious implications for a people with a genetic susceptibility to diabetes, the byproduct of ancestral genes developed to hoard fat during cycles of feast and famine. This vulnerability was first noticed decades ago when immigrant Indians who were settled in Western countries got diabetes at levels dwarfing those in India.

Now westernization has come to India and is bringing the disease home.

Though 70 percent of the population remains rural, Indians are steadily forsaking paddy fields for a city lifestyle that entails less movement, more fattening foods and higher stress — a bleak brew for diabetes.

In Madras, about 10 percent of adults are thought to have the disease, one of India's highest concentrations, more than the soaring levels in New York, and triple the rate two decades ago. Those local hospitals, quaintly known as the sugar hospitals, are devoted to the illness.

The pungent aromas of quick-food emporiums waft everywhere here. Snacks are obligatory at social occasions — weddings, office parties, mourning observances — and during any visit to someone's home, a signal of how welcome the visitor are and that God is present.

In the United States, an inverse correlation persists between income and diabetes. Since fattening food is cheap, the poor become heavier than the rich, and they exercise less and receive inferior health care. In India, the disease tends to directly track income.

"Jokingly in talks," said Dr. V. Mohan, chairing Diabetes Specialities Centre, a local hospital, "I say you haven't made it in society until you get a touch of diabetes."

The New York Times

Photographs with commentary on the sweet shops and 'sugar hospitals' in urban India.
Prevalence of Diabetes in Urban India (Chennai)

Prevalence 2000 – 13.9%
Prevalence 2006 – 18.6%

Ramachandran et al. Diabetes Care 2008
“If current trends continue, by 2020, diabetes will be the leading cause of disease for men and the second leading cause for women.”
Diabetes In Indigenous Australians: Age-Specific Prevalence (%)

Prevalence %

Age group (years)

- AusDiab
- Aboriginal
- TSI

Kerin O’Dea 2002
Australian Indigenous people have one of the highest rates of diabetes in the world.

They have the highest rate of end-stage renal deaths in the world.

Alice Springs has the largest renal dialysis unit in the Southern Hemisphere!
The Middle East – The World’s Diabetes Epicentre?

Diabetes prevalence for adults age 20-79

- UAE: 18.7%
- Bahrain: 15.4%
- S. Arabia: 16.8%
- Oman: 13.4%
- Kuwait: 14.6%
Genetic-Environment Interaction for Type 2 Diabetes

ENVIRONMENT

EARLY LIFE
• Low birth weight
• Poor nutrition

ADULT LIFE
• Sedentary lifestyle
• Dietary factors

DIABETES +/-
THE METABOLIC SYNDROME

GENES

CARDIOVASCULAR DISEASE

GENES
Epigenetics: Foetal Programming & Intergenerational Risk
Developmental plasticity is the process where a stimulus applied *in utero* establishes a permanent response in the foetus leading to enhanced susceptibility to later disease, eg type 2 diabetes and cardiovascular disease.
The Dutch Winter Famine

- At the end of WW2, West Netherlands population suffered an acute famine
- Allocated rations were 400 to 800 calories/day
- Women exposed to this during the 2nd and 3rd trimester of pregnancy delivered small babies.
- As adults, these babies (exposed to famine in utero) had a higher prevalence:
  - Type 2 diabetes
  - Cardiovascular disease (heart attacks, strokes)
  - Hypertension
  - Obesity
  - Schizophrenia
Diabetes in Cambodia: (30 years after Pol Pot) regime

Diabetes and associated disorders in Cambodia: two epidemiological surveys

Summary
Background The Asia-Pacific region is thought to be severely affected by diabetes. However, reliable, standardised data on prevalence and characteristics of glucose intolerance in Asian populations remain sparse. We describe the results of two field surveys undertaken in Cambodia in 2004.

Methods 2246 randomly selected adults aged 15 years and older were examined in two communities, one rural (Siem Reap) and one semi-urban (Kampong Cham). The diagnosis of diabetes and impaired glucose tolerance was based on 2h blood glucose estimation using criteria recommended by the latest report of a WHO Expert Group. Blood pressure, anthropometry, habitual diet, and other relevant characteristics were also recorded.

Findings Prevalence of diabetes was 5% in Siem Reap and 11% in Kampong Cham. Prevalence of impaired glucose tolerance was 18% in Siem Reap and 13% in Kampong Cham. About two-thirds of all cases of diabetes were undiagnosed before the survey. Prevalence of hypertension was 12% at Siem Reap and 25% at Kampong Cham. People in Kampang Cham had higher estimates of central obesity than those in Siem Reap.

Interpretation Diabetes and hypertension are not uncommon in Cambodia. A quarter of all adults in the chosen suburban community had some degree of glucose intolerance. Since Cambodian society is relatively poor, and lifestyle is fairly traditional by international standards, these findings are unexpected.
Conclusions

• Diabesity continues to rise exponentially globally
• Ageing, lifestyle change & urbanisation have been targeted as the main drivers but in developing nations & indigenous communities, the story may be very different
• A greater focus on epigenetics & early life risk factors eg maternal nutrition may lead to more effective strategies to halt this global “perfect storm” of Diabesity
• By 2020, Diabesity is set to bankrupt the economies of many nations unless action is taken
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