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Epidemiology Of Coronary Heart Disease, Stroke, Cancer In India- A Review Study

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Abstract:

Coronary heart disease (CHD), stroke and cancer are the three leading causes of death worldwide. These three disorders are major epidemic in India and one of the major causes of disease-burden and deaths. Mortality data from the Registrar General of India shows that cardiovascular diseases are a major cause of death in India now, along with cancer. In India, the growing incidence of these disorders is not yet seen as a public health challenge which has resulted in the absence of a strong policy targeting them. Clinical trials are increasingly common in India, but clinical registries that document the current state of these disorders in India are lacking. In conclusion, there is an urgent need to have an updated review of the incidence, prevalence and mortality rate of these disorders in India so that a practical and accurate estimation of these epidemics is known to develop appropriates strategies for their prevention and control. An urgent and sincere bureaucratic, political, and social will to initiate steps in this direction is required.

Key words*: Coronary heart disease, stroke, cancer, epidemiology*

1.Introduction

Coronary heart disease (CHD), stroke and tumors are the three leading causes of death worldwide.[1] These three disorders are major concerns in both developed and developing countries and impose a considerable burden on the economy of these countries.

The epidemiological studies are of great help in determining the prevalence distribution of diseases & estimating risk factors as well as streamlining the health services for prevention and treatment of the diseases. Properly organized sample studies covering the population as a whole may be necessary for correct assessment. No doubt the epidemiological studies are being conducted throughout the world but in developing countries like India an updated review in this aspect is lacking. As CHD, stroke and tumours are the major causes of death, it was imperative to have an epidemiological review of these disorders, particularly in India.

For Cerebrovascular Disease (CVDs) specifically, in 2005, the age standardized mortality rate for developing nations like India, China, and Brazil was between 300-450 per 100,000, whereas it was around 100-200 per 100,000 for developed countries like USA and Japan.[2]

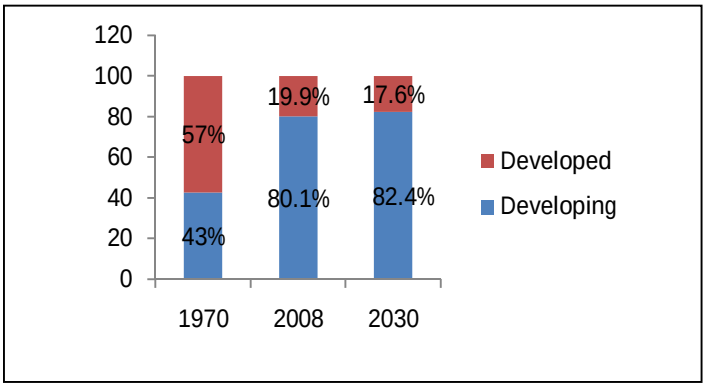

Figure 1: Shifting load of Non communicable diseases (NCD) to developing countries

Source: 1. Global Burden of Diseases 2004. Projected Deaths 2030, Baseline Scenario. World Health Organization, 2008

2.Global Estimates And Projections Of Mortality By Cause, 1970- 2015. The World Bank, 1992

The data suggests that CHD is currently the most common, non-infectious disease in India and will affect over 65 million of its people by the year 2015.[3] Previously thought to affect primarily high-income countries, CHD now leads to more death and disability in low- and middle-income countries, such as India, with rates that are increasing

disproportionately compared to high-income countries. But, the emergence of the CVD epidemic in the developing countries during the past two or three decades has attracted less comment and little public health response, even within these countries.[4]

Overall, CVDs accounted for around one-fourth of all deaths in India in 2008 and are expected to be the fastest growing chronic illnesses between 2005 and 2015, growing at 9.2% annually, and accounting for the second largest number of NCD patients after mental illnesses. A more worrying fact is that the incidences of CVDs have gone up significantly for people between the ages 25 and 69 to 24.8%, which means we are losing more productive people to these diseases.[5]

As far as stroke is concerned, according to WHO, stroke was the second commonest cause of mortality worldwide in 1990 and the third commonest cause of mortality in more developed countries.[6] It is the second leading cause of death above the age of 60 years, and the fifth leading cause of death in people aged 15 to 59 years old.[7] In the most recent estimates made in 1999, the number of deaths due to stroke reached 5·54 million worldwide,[8] with two-thirds of these deaths occurring in less developed countries.[9] The average age –standardized prevalence of stroke worldwide is between 5 and 10 per 1000 population.[10]

After CHD and stroke, cancer is one of the leading causes of adult deaths worldwide. It was estimated that in the year 2000, worldwide over 10 million new cases of cancer occurred (approximately 5.3 million men and 4.7 million women) and over 6 million people died from cancers.[11] In India, the International Agency for Research on Cancer estimated indirectly that about 635 000 people died from cancer in 2008, representing about 8% of all estimated global cancer deaths and about 6% of all deaths in India.[12] Based on the NCRP data new cancer cases in India will be raised to 1,044,650 by the year 2020.[13]

With these aspects in mind and considering the impact of these disorders globally and especially in India, an updated review is essential to understand the current reality of these disorders. India will soon face an enormous socio-economic burden on the costs of the rehabilitation of stroke-survivors because the population is now surviving through peak years (age 55-65) of occurrence of stroke (CVD).

In developing countries like India, the process and the system of conducting epidemiological studies is quite different from what is being followed in developed nations. Here the two stage method is mainly recommended for carrying the studies. This method involves a preliminary screening for the particular disorder by trained non-

professionals and subsequent examination & diagnosis by concerned professional or physician. But, conducting an epidemiological study in a country having such a large variation in geography, culture, food habits, climate and other demographic variables is daunting task. Therefore, many of these studies have certain inherent deficiencies which are unavoidable under any circumstances. Many studies are done retrospectively and therefore they depend to a large extent of proper maintenance of patient's record. So it is a huge challenge to conduct such studies in India and it is worth to appreciate to work done so far in this direction.

The aim of this review is, therefore, to analyze published population-based studies of the incidence, prevalence and mortality of CHD, stroke and cancer. This will increase our current knowledge and facilitate health-care planning, prevention, and management. Therefore, this study is an attempt to review the present quality literature available on the prevalence and incidence rate of CHD, Cancer & Stroke in India.

2.Epidemiology Of CHD

No prospective national cohort registries of CHD in India have published CHD incidence rates. CHD prevalence rates can be estimated from several studies over the past several decades in either rural or urban cohorts, as shown in the below atlas.[14]

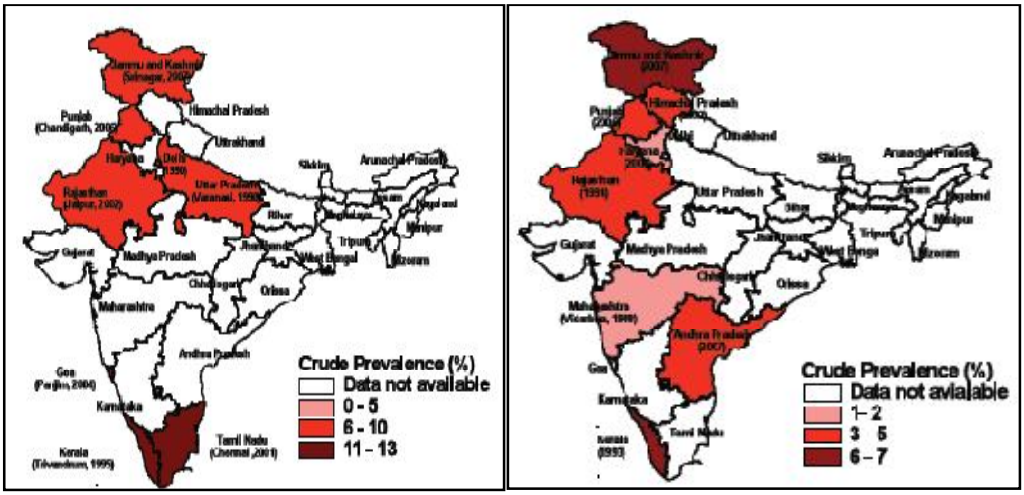

Figure 2: Atlas of CHD in India (A) Urban CHD prevalence (1990 – 2007) (B) Rural CHD prevalence (1988 – 2007)

In 2000, there were an estimated 29.8 million people with CHD in India, out of a total estimated population of 1.03 billion people, or a nearly 3% overall prevalence.[14] Unadjusted CHD rates have ranged from 1.6% to 7.4% in rural populations and 1% to

13.2% in urban populations.. In developed countries, it is predicted to rise 30-60% between 1990 and 2020. In developing countries, rates are predicted to increase by 120% in women and 137% in men from 1990 to 2020.[2]

Table 1 demonstrates this rising prevalence of CHD in India compared to China and established market economies (EME) from 1990 to 2020.

	1990			2000			2010			2020		
	India	China	EME	India	China	EME	India	China	EME	India	China	EME
CVD	2.26	2.57	3.18	3.01	3.30	3.49	3.80	3.81	3.53	4.77	4.53	3.66
CHD	1.18	0.76	1.67	1.59	0.99	1.84	2.03	1.15	1.87	2.58	1.37	1.95

Table1: Cardiovascular disease (CVD) and coronary heart disease (CHD) deaths (millions) in India, China, and established market economies (EME) from the Global Burden of Diseases Study.[2]

3.CHD Related Mortality

The absence of reliable mortality data in the Indian subcontinent has necessitated estimates of the CVD burden based on cross-sectional studies that have been well described previously.[16] According to the Global Burden of Disease Study, the developing countries contributed 3.5 million of the 6.2 million global deaths from CHD in 1990. The projections estimate that these countries will account for 7.8 million of the 11.1 million deaths in 2020.[17]

Fifty percent of CHD-related deaths in India occur in people <70 years of age, whereas only 22% of CHD-related deaths in Western countries occur in this age group.[15] Leeder et al estimated total years of life lost due to total CVD among the Indian men and women aged 35- 64 to be higher than comparable countries such as Brazil and China, as demonstrated in Table 2 These estimates are predicted to increase from 2000 to 2030, when the differences may become more marked.[18]

	2000		2030	
	Total years life lost	**Rate per 100,000**	**Total years life lost**	**Rate per 100,000**
India	9,221,165	3,572	17,937,070	3,707
Brazil	1,060,840	2,121	1,741,620	1,957
China	6,666,990	1,595	10,460,030	1,863

Table 2: Estimates of total years of life lost due to CVD in 2000 and 2030. [18]

4.Epidemiology Of Stroke

In the early 1980s the prevalence rates of stroke were around 500-700 per 100,000 in the western countries[19] and 900 per 100,000 in Asia.[20] In India, several epidemiological studies have been undertaken in different parts of the country since the eighties. Most of these populations based surveys however, were cross-sectional and determined the prevalence rates of stroke in the communities. The first community-based study on stroke was carried out in and around the town of Vellore in South India[21] during the period 1969-71, followed by the study in Rohtak in North India[22] during 1971-74. Subsequently there was a spate of population-based surveys on stroke in various parts of India both in urban and in rural communities during the eighties and nineties.[21-30] They have been listed in Table 3.

Zone	Place	Rural/urban	Year	Population	Crude prevalence rate per 100,000	Age-adjusted prevalence per 100,000
North	Rohtak, Haryana[22]	Urban	1971-74	79,046	44	__
	Kuthar Valley, Kashmir[23]	Rural	1986	63,645	143	244*
West	Mumbai among parsis[24]	Urban	1985	14,010	842	424*
	Mumbai[25]	Urban	1997	145,456	220	__
East	Malda, West	Rural	1989-	37,286	126	__

	Bengal[26]		90			
	Baruipur, West Bengal[27]	Rural	1992-93	50,291	147	__
	Kolkata[28]	Urban	1998-99	50,291	147	334**
South	Vellore[21]	Rural	1969-71	258,576	57	84#
	Gowribidinur, Karnataka[29]	Rural	1982-84	57,660	52	__
	Bangalore[30]	Rural	1993-95	51,055	165	262#
	Bangalore[30]	Urban	1993-95	51,502	136	__

Table 3: The prevalence rates of stroke from various major epidemiological studies in India[21-30]

There were only a few surveys in India where the annual incidence rate (AIR) of stroke was determined. These are listed in Table 4

.

Place	Rural/urban	Year	Population	Annual incidence rate per 100,000	Age adjusted annual incidence rate per 100,000
Vellore[21]	Rural	1969-71	258,576	13	__
Kolkata[28]	Urban	1998-99	50,291	36	105*
Baruipur, West Bengal[31]	Rural	1993-98	20,842	124	262**

Table 4: The Annual incidence rates of stroke from various epidemiological studies in India.[21, 28, 31]

**Age adjusted to 1996 US population; **Age-adjusted to 1990 US population*

5.Stroke Related Mortality

There were limited data available on stroke related mortality in India. Although medical certification of the cause of death is a legal requirement, only 13.5% of all deaths in India were medically certified[32] in 1994. Therefore ascertainment of the cause of death was grossly inadequate in India. However, it was estimated that stroke represented 1.2 % of the total deaths in the country, when all ages were included. WHO estimates for 2001 indicate that death from stroke in low-income and middle-income countries accounted for 85.5% of stroke deaths worldwide.[33]

6.Epidemiology Of Cancer

Population-based cancer registry (PBCR) is the source of data in estimating the incidence and mortality as it records all cancer cases occurring in a defined region. Keeping in view the paucity of reliable data in a country with wide socio-cultural diversity, the Indian Council of Medical Research (ICMR) initiated a network of cancer registration through the National Cancer Registry Programme (NCRP) in 1982 to set up cancer registries in different regions of the country. The ICMR network of registries now consists of 6 PBCRs located at Bangalore, Bhopal, Chennai, Delhi and Mumbai (5 urban) and Barshi (rural).[34]

From the population-based registries in India covering 28–30 million population from different parts of the country, the age adjusted incidence rates vary from 44 to 122 per 100,000 population in males and 52 to 128 per 100,000 females.[35-37] It is estimated that presently nearly one million new cancer cases are being detected annually in the country.[38] The lifetime cumulative risk indicates that an average of one of 10 to 13 people in the urban areas was stricken by cancer during their lifetime.[39]

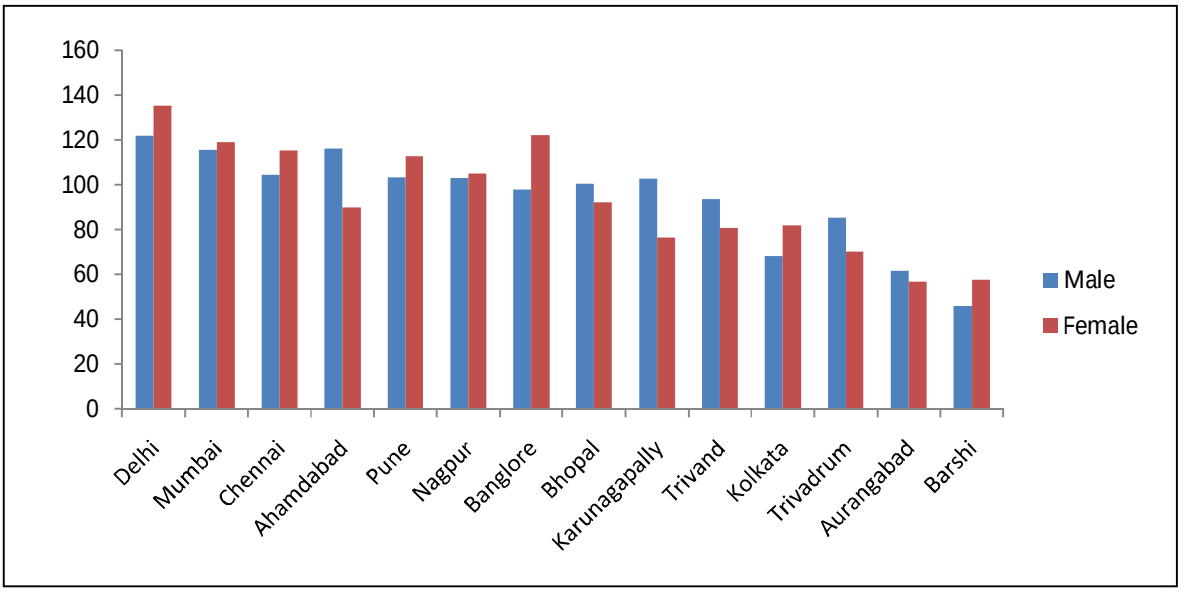

Figure 3: Age adjusted incidence rates of all cancers in India
Sources -1.Cancer Registry Abstract (2001). Newsletter Natl, Cancer Registry Project India.
2.Parkin, D.M., Whelan, S.L., Ferlay, J., Raymond, L., Young, J. (Eds.) (1997). Cancer Incidence in five continents, IARC Scientific Publications No 143., IARC, Lyon. 3.Population based Cancer Registry Report 1991–95, Regional Cancer Centre, Trivandrum; 1999

In 1994, the crude incidence rates of cancer in India varied between 57.5 and 78.6 per 100,000 men; and between 57.7 and 89.7 per 10,000 women in urban registry areas. The age standardized incidence rates range from 98.7 to 138.3 per 100,000 men; and from 108.0 to 143.4 per 100,000 women in urban areas. The crude incidence rate for cancers at all sites in rural Barshi was reported to be 32.9 per 100,000 men and 49.7 per 100,000 women. The age standardized incidence rate in Barshi was 41.1 and 56.3 per 100,000 men & women, respectively.[40]

As the incidence, prevalence and mortality of cancer varies considerably among different parts of the body, it is utmost essential to have an epidemiological review of cancer according to the affection in different sites of the body. Cervical cancer is one of the most common cancers among women worldwide.[41] In India, in 2004, cervical cancer was the third largest cause of cancer mortality, and had an age-standardised incidence rate of 30.7 per 100,000 women in 2002, 1-year prevalence of 101,583, and 5-year prevalence of 370,243.[42-44]

In India, breast cancer is the second most common cancer with an estimated 115,251 new diagnoses and the second most common cause of cancer-related deaths with 53,592

deaths in 2008. The age-standardized incidence rate for breast cancer in India is 22.9 per 100,000, one-third that of Western countries and the mortality rates are disproportionately higher.[45, 46]. It is the cancer of breast alone which is expected to cross the figure of 100,000 by the year 2020.

Ovarian cancer is also an important cause of morbidity and mortality, especially in the middle aged women. In India, during the period 2004-2005, proportion of ovarian cancer varied from 1.7% to 8.7% of all female cancers in various urban and rural population based registries operating under the net- work of the National Cancer Registry programme (NCRP) of Indian Council Medical Research. The proportion of this cancer was 6.0% and 7.7% of all cancers among females in rural Barshi and Ahmedabad registry areas.[12]

Although not very frequent, brain tumors contribute significantly to morbidity, often affect children and overall have a poor prognosis. The majority of patients die within 9-12 months and less than 3% survive more than 3 years. In India, by the year 2020, the cases of head & neck cancers are estimated to be around 218,421 (19.0% of All sites cancers). The average age adjusted incidence rates for CNS cancers ranged in males from 2.53 (Chennai registry) to 4.14 (Delhi registry) while in females it ranged from 1.46 (Bhopal registry) to 2.66 (Delhi registry). The estimates for head & neck cancers for the year 2010 for males and females are 122,643 and 53,148 respectively, which by the year 2020 will rise to 153,636 and 64,785.[13]

Lung, oesophagus, stomach, oral and pharyngeal cancers are much higher in men while in females the cancers of cervix and breast are predominant forms followed by those of stomach and oesophagus. There is variation in the site wise distribution within the various population registries. Oesophageal cancers are often found in the southern states of India such as in Bangalore and Chennai and also in Mumbai and Ahmedabad. Stomach cancers are more common in southern India with the highest incidence in Chennai. Cancers of the oral cavity are high in Kerala (south India) and pharyngeal cancers in Mumbai (western India). Thyroid cancers among women are more common in Kerala. Gall bladder cancer is high in northern India, particularly in Delhi and Kolkata.[35-37]

Over all in India, the total cancer cases are likely to go up from 979,786 cases in the year 2010 to 1,148,757 cases in the year 2020. The tobacco-related cancers for males are estimated to go up from 190,244 in the year 2010 to 225,241 in the year 2020. Similarly, the female cases will go up from 75,289 in year 2010 to 93,563 in the year 2020.

Gynecological-related cancers are estimated to go up from 153,850 in 2010 to 182,602 in 2020. Among males and females, cancer of breast alone is expected to cross the figure of 100,000 by the year 2020.[13]

7.Cancer Mortality

In India, the International Agency for Research on Cancer estimated indirectly that about 635 000 people died from cancer in 2008, representing about 8% of all estimated global cancer deaths and about 6% of all deaths in India.[12] The Mumbai cancer registry has reported the age-adjusted mortality rate (AAMR) of 62 per 100,000 males and 58 per 100,000 females. The AAMR per 100,000 populations for males and females in Bangalore was 30 and 29 and in Chennai 62 and 56 respectively.[34] But, the cancer mortality rates are under-reported due to poor recording of the cause of death. The age specific mortality rates & total deaths from specific cancers have not been much documented for the various regards & sub populations in India. At 30-69 years, the three most common fatal cancers were oral, stomach, & lung in men, and cervical, stomach & breast in women. Age-standardized cancer mortality rates per 100 000 were similar in rural men 95·6 and women 96·6 and urban areas men 102·4 and women 91·2.[47]

From the above findings it can be summarized that, to conduct an epidemiological survey in a developing country like India is an uphill task. Many population based surveys on CHD, stroke and cancer have been conducted in various parts of India but they were done to determine the cross-sectional prevalence rates. There are many major challenges in determining the incidence and prevalence rates of these disorders in a country like India. The first major problem is in the maintenance of proper medical records by the hospitals as well as primary health centers. The process of up keeping & analysis of the patient's record is done rarely in India. This leads to missing of primary and basic information about the incidence of these disorders.

The second major problem is lack of awareness among patients and health professionals regarding registration of these disorders in specific registries. Moreover the patient diagnosed with these disorders are not registered I the specific registries as well as many of these registries are not available at primary level. The fact, majority of our population live in rural areas futher makes this task difficult. As the people lack awareness & are inaccessible to registries. Even people living in urban areas, no doubt are properly diagnosed at appropriate time but this largely depends upon patient's own effort. This is because patients having high economic standards have early and better access to super

specialized professionals whereas patients around poverty line are dependent on the facilities provided by the government. Since most of the population can't afford preventive health check-ups available at tertiary care hospitals, it aggravates the already rising risk factors in the affected population leading to serious ailments in the future.

About three-quarters of Indians live in rural areas. Yet, mortality for specific cancers is estimated mostly with data from India's 24 urban population-based cancer registries, with only two registries representing rural areas.[48] Most deaths in India (and in most low-income or middle-income countries) occur at home and without medical attention.[49] Thus, alternative methods to obtain information about cancer and other deaths are necessary.

In India, the growing incidence of these disorders is not yet seen as a public health challenge which has resulted in the absence of a strong policy targeting them. Though the Government has recently started taking initiatives by introducing programmes focusing on screening and detection of the rural population for symptoms of these disorders, these initiatives need to be scaled up to reach out to the population all over the country. A focussed policy targeting them will attract the attention of various stakeholders and lead to concentrated efforts to reduce the mortality and morbidity arising due to them. National surveillance data collection is currently limited in India and this gap presents perhaps the most significant hurdle in epidemiological research in India. Better baseline CHD data could provide useful information for better risk/resource balance for research and prevention.

Clinical trials are increasingly common in India, but clinical registries that document the current state of these disorders in India are lacking. The dearth of such data limits the ability to evaluate effectiveness and penetration of interventions at the community level.

Thus, in conclusion, cardiovascular disease and cancer are the prevailing non communicable cause of death and disability in the Indian subcontinent, and will become the prevailing overall causes of mortality among the inhabitants of South Asia in the next 20 years. So uunderstanding the geographical and social distribution of specific disorders is essential to target control programmes and spur further research into the causes of these disorders causes of death in any low-income or middle-income country. We focus on the geographical and social variation in specific cancers, and the degree to which these cancers might be avoidable by controlling their risk factors or causative agents.

Therefore there is a desired need for more epidemiological studies in different parts of India. In this respect a door-to-door survey may be the design of choice and can be

implemented. This kind of trend analysis is important information for public health and health care planning for prevention and control.The current surveillance data collection related to these disorders is limited and inconclusive. Better baseline epidemiological data could provide useful information related to these disorders and can help in designing an appropriate and effective strategy in their management. Resources should be directed toward applying the existing knowledge base to tackle the CVD epidemic in policy, capacity building, and research arenas. Control of the CVD epidemic in the Indian subcontinent is tenable in the foreseeable future, provided that policy makers, the lay public, and health professionals in the India subcontinent acknowledge its potential impact and promptly act to address it.

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