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VALIDITY OF RETROSPECTIVE AMENDMENTS TO INDIAN TAXATION STATUTES

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Abstract: Economic growth is largely determined by the balance sheets of existing industries. And if economic development is our goal, tax reduction is the best and simplest way forward. The increasing and ‘unnecessary tax’ burden has to be scaled down to the demands of Industrialization, and retrospective tax legislation (to reduce the tax), in line with the criteria listed afore, is one way to go about it.

INTRODUCTION

The past few years have witnessed numerous retrospectively applicable amendments to tax law. And though their terms make them unequivocally enforceable, their validity remains enshrouded in ambiguity. The validity of such amendments is an issue of serious import and this paper is an attempt to grapple with the same.

Article 245(1) of the Constitution gives power to the Parliament to enact laws for the whole or any part of the territory of India, and the Legislature of a State to make laws for the whole or any part of the State. The power so broadly postulated enables the legislative to enact both prospective as well as retrospective law.¹ Though taxing statutes are no exception to this rule², the presumption, in the absence of a contrary intention, is always one of “prospectivity”. Amendments, however, when they are of an explanatory, declaratory, curative or clarificatory nature, whether or not expressly retrospective, are to be judicially construed as retrospective.³ The rationale of non-retrospectivity, it is submitted, is in its opposition to arbitrary infliction of taxes. Tax statutes are generally predicated on the principle, ‘*Nova constitutio futuris forman imponere debet non praeteritis*’ – every new enactment should affect the future and not the past.

RETROSPECTIVE AMENDMENTS

A statute is deemed to be retrospective when it takes away or impairs any vested right acquired under existing laws, or creates a new obligation, or imposes a new duty or attaches a new disability in respect to transactions or considerations already past.⁴

Amendments which contemplate the past or which are made to affect acts, facts or rights occurring before their coming into force are known as ‘retrospective amendments’. In *Darshan Singh v. Ram Pal Singh*⁵, the Supreme Court said retrospective statute means a statute which creates a new obligation on transactions or considerations already past or destroys or impairs vested rights. K.J.Aiyar⁶ states that the word ‘retrospective’ when used with reference to an enactment may mean (i) affecting an existing contract; or (ii) re-opening of a past, closed and completed

¹ Nongthombam Ibomcha Singh v. Leisangthem, AIR 1977 SC 682 (683); Nandu Mal Girdhari Law (M/s.) v. State of Uttar Pradesh, AIR 1992 SC 2084.

² Sanctus Drugs v. UOI 225 ITR 252.

³ CIT v. India Steamship 196 ITR 917.

⁴ See: Craies on Statute Law, 7th Edn., p. 387.

⁵ 1992 Supp (1) SCC 191.

⁶ Judicial Dictionary, 13th Edn., Butterworth, p. 857.

transaction; or (iii) affecting accrued rights and remedies; or (iv) affecting procedure. In *State of Jammu and Kashmir v. Shri Triloki Nath Khosa and Ors.*⁷, as also in *Chairman, Railway Board and Ors. v. C.R. Rangadhamaiyah and Ors.*⁸, the Hon'ble Supreme Court held that provisions which operate to affect only future rights without affecting benefits or rights already accrued or enjoyed, till the deletion, is not retrospective in operation.

An amendment cannot be made retrospective from a date earlier than one on which the provision sought to be amended itself was brought on the statute book.⁹ Where legislation is introduced to overcome a judicial decision, the power cannot be used to subvert the decision without removing the statutory basis of the decision,¹⁰ and interestingly such power cannot be used simply for nullifying the judgment where no defect in the original law is marked¹¹. When retroactive legislation is enacted by the appropriate legislative authority, the same must be given effect to in all pending cases of appeal or reference.¹² In *CIT v. Hindustan Electro*¹³, the Supreme Court held that an assessee cannot be held liable for filing a wrong return if the relevant law is retrospectively amended subsequent to his filing. Further, if there is a right of appeal on the date of the initiation of assessment proceedings, such right remains unaffected by an amendment imposing conditions on the same unless there exist contrary statutory indication.¹⁴

VALIDITY OF RETROSPECTIVE AMENDMENTS

Since the Constitution of India is the supreme law, all other laws, including taxation laws, are subordinate to it and must be read and interpreted in the light of constitutional provisions.¹⁵ In the case of *Piare Dusadh v. The King Emperor*¹⁶, it was held that an ordinance having retrospective effect is not invalid as there is nothing in the Indian Constitution which prohibits the same. This legislative power, i.e. the power to introduce enactments for the first time or to amend enacted law with retrospective effect, is however subject to several judicially recognized limitations.¹⁷

Firstly, words used must expressly provide for retrospective operation as in the case of a taxing statute, the presumption is that of 'prospectivity'. Secondly, the retrospectivity must be reasonable and not excessive. Lastly, it is apposite when legislation is introduced to overcome a judicial decision, for as has been stated legislative power cannot be used to subvert a decision without first removing the statutory basis of the decision. In cases where the aforementioned criteria is not met the courts will usually intervene at the tax payers behest.

The general rule as stated by Halsbury in Vol. 36 of the Laws of England (3rd Ed.) and reiterated in several decisions of the Supreme Court as well as English Courts is that "all statutes other than those which are merely declaratory or which relate only to matters of procedure or of evidence are *prima facie* prospective" and retrospective operation should not be given to a statute so

⁷ (1974)ILLJ121SC.

⁸ AIR1997SC3828.

⁹ *Ritz v. UOI* 184 ITR 599.

¹⁰ *National Agricultural Co-Operative Marketing Federation of India Ltd. & Anr. v. Union Of India & Ors* [2003]260ITR548(SC).

¹¹ *Netley v. ACAGIT* 257 ITR 532.

¹² *Bennett Coleman v. CIT* 49 ITR 264.

¹³ 243 ITR 48(SC).

¹⁴ *CIT v. Bengal Cardboard* 176 ITR 193.

¹⁵ *CIT v. Harijan Nigam* 226 ITR 696.

¹⁶ AIR 1944 FC 1.

¹⁷ Supra note 10.

as to affect, alter or destroy an existing right or create a new liability or obligation unless that effect cannot be avoided without doing violence to the language of the enactment. Following are some of the conditions and limitations enumerated below:

Protection to Public

Retrospective legislation may be held invalid on the ground that it is unreasonable, or beyond legislative competence, or violative of Constitutional provisions, or not in general public interest. If a statute is passed for protecting the public against some evil or abuse, it may be allowed to operate retrospectively, although by such operation it will deprive some person or persons of a vested right. In *Virendra Singh Hooda v. State of Haryana*¹⁸ the Supreme Court upheld this condition.

Expressly Provided

"Every statute, it has been said", observed LOPES, L.J., "which takes away or impairs vested rights acquired under existing laws, or creates a new obligation or imposes a new duty, or attaches a new disability in respect of transactions already past, must be presumed to be intended not to have a retrospective effect."¹⁹ Close attention must be paid to the language of the statutory provision for determining the scope of retrospectivity intended by Parliament.²⁰

In *Govinddas and Ors. v. Income Tax Officer and Anr.*²¹, it was laid down that if the enactment is expressed in language which is fairly capable of either interpretation, it ought to be construed as prospective only. In this case the principal contention of the petitioners was that the provision in Section 171(6) and (7) the Income Tax Act, 1961 had no application where the assessment of a Hindu Undivided Family was made under the provisions of the Indian Income Tax Act, 1922. Section 25A of the 1922 Act did not impose any personal liability on the members for the tax assessed on the Hindu Undivided Family in case of partial partition. This contention was rejected by the High Court, but the Supreme Court said it is clear that Section 171(6) applies only to a situation where the assessment of a Hindu undivided family is completed under Section 143 or Section 144 of the new Act. It can have no application where the assessment of a Hindu undivided family is completed under the provisions of the old Act as retrospective operation is not warranted either by express language of the said provision or by necessary implication. Therefore, unless the terms of a statute expressly so provide or necessarily require it, retrospective operation should not be given to a statute so as to take away or impair an existing right or create a new obligation or impose a new liability, save in matters of procedure.²²

Similarly, in *S.L. Srinivasa Jute Twine Mills P. Ltd. V. Union of India (UOI) and anr.* a writ petition was filed before the High Court, praying issuance of mandamus to declare that Act 10 of 1998 seeking to amend provisions of Section 16 of the Employees Provident Fund and Miscellaneous Provisions Act, 1952 shall not apply to the petitioners and they would continue to have the "infancy protection" for the period of 3 years starting from the date of establishment of the industry. The High Court dismissed the writ petitions and an appeal was made before the Supreme Court, which held that "Unless there were words in the statute sufficient to show the intention of

¹⁸ AIR 2005 SC 137(148).

¹⁹ Amireddi Raja Gopala Rao v. Amireddi Sitharamamma [1965]3SCR122).

²⁰ See also: Union of India v. Raghubir Singh [1989]178ITR548(SC).

²¹ [1976]103ITR123(SC).

²² See also: Reid v. Reid (1886) 31 Ch D 402; Delhi Cloth Mills & General Co. Ltd. v. CIT, Delhi MANU/PR/0050/1927; Keshvan Madhavan Memon v. State of Bombay MANU/SC/0020/1951 : 1951CriLJ680); Magic Wash Industries (P) Ltd. v. Assistant Provident Fund Commissioner, Panaji and Anr. 1999 Lab.I.C. 2197; S. Gadgil v. Lal & Co. [1964]53ITR231(SC); J.P. Jani, ITO v. Induprasad Devshanker Bhatti [1969]72ITR595(SC).

the legislature to affect existing rights, it was deemed to be prospective only." This being the legal position, the judgment of the High Court was indefensible and thus set aside.

REASONABLE

Amendments having retrospective application must be reasonable and not excessive or harsh, otherwise they runs the risk of being struck down as unconstitutional.²³

In *Rai Ramkrishna v. State of Bihar*²⁴ the court said that where legislative competency is determined it extends to both prospective operation and retrospective operation. Further, legislative power includes the subsidiary or the auxiliary power to validate law which is found to be invalid. In this case, the appellants challenged the validity of the Bihar Taxation on Passengers and Goods (Carried by Public Service Motor Vehicles) Act, 1961. The Act contains certain provisions, which validate certain provisions of The Bihar Finance Act, 1950 that were struck down by the court. The petition was dismissed by the High Court and an appeal was made to the Hon'ble Supreme Court. It was held that if the essential features of a taxing statute are within the competence of the legislature its character is not necessarily changed merely by its retrospective operation. The restriction imposed on the fundamental rights of the Appellants under Art. 19(1)(f) and (g) was reasonable within the meaning of Art. 19(5) and (6) and Art. 304(b). However the Court quashed the imposition of retrospective tax because it found the imposition against equity and held that if the retrospective feature of a law is unreasonable, arbitrary and burdensome the statute cannot be sustained.

There are many arguments for retrospective amendments as there are against it. The Hon'ble High court of Delhi²⁵ in the case of *Home Solutions Retail India Ltd. & Others vs. UOI* struck down levying of tax by observing that the renting of immovable property for use in the course of furtherance of business or commerce does not involve any value addition and therefore, cannot be regarded as service. In view of this judgment, commercial tenants have stopped reimbursing the tax element. Subsequently, the definition of taxable service 'Renting of immovable property'²⁶ was amended with retrospective effect by the Finance Bill 2010 to provide explicitly that the activity of 'renting' itself is a taxable service. The amendment has nullified the decision of the Hon'ble High Court. Besides pending cases before the Hon'ble Supreme Court on the question of validity, the landlord will now have to pay service tax w.e.f. 01-05-07 even if they have not collected it from the tenant under the protection of judiciary. For those landlords where the tenancy is still continuing, they may try to enforce the collection from the existing tenant. But what of the landlords whose tenants have already vacated the premises and are not traceable?

Time Barred Assessments Cannot be Reopened

In *National Agricultural Co-Operative Marketing Federation of India Ltd. & Anr. v. Union Of India & Ors.*, the issue raised by the appellants related to the construction and constitutional validity of section 80P(2)(a)(iii) of the Income Tax Act, 1961. The Finance (No. 2) Act, 1967, section 81 re-enacted as section 80P of the 1961 Act, provided deduction for the marketing of the agricultural produce "of" its members. Now the Supreme Court in earlier decisions interpreted "of" as "*produce by members*" and later as "*belonging to members*". Subsequently Parliament retrospectively amended section 80P(2)(a)(iii) and substituted "of" with the phrase "grown by".

²³ See also: *Jawaharmal v. State of Rajasthan*, [1966]1SCR890; Supreme Court Employees Welfare Association v. Union of India, MANU/SC/0305/1986.

²⁴ AIR 1963 SC 1667.

²⁵ Order dated 18.04.2009.

²⁶ Section 65 (105) (zzzz).

The retrospective substitution was included from 1-4-1968, the date when the section was introduced in the statute, thereby validating the provision. That said the 1998 amendment, however, cannot be construed as authorizing revenue authorities to reopen assessments when such reopening is already barred by limitation. The ratio of the case can be read as – on retrospective amendment of provision(s), time barred assessments cannot be reopened.

Violation of Art 14 of the Constitution of India

The power to tax is an incident of Sovereignty²⁷ and in the case of *State of Tamil Nadu v. M/s. Arooran Sugars Ltd.*²⁸, the Hon'ble Supreme Court said the power of the Legislature to amend, delete or to enact a statute prospectively or retrospectively cannot be questioned and challenged unless the Court is of the view that such exercise is in violation of Article 14 of the Constitution.

In every case the introduction or deletion of a provision with retrospective effect does not per se amount to violation of Article 14. However in case of taxation, if retrospective amendments are validated, the State, by necessary implication, assumes a superior footing thereby resulting in violation of the equality principle as guaranteed under the Indian Constitution.

Violation of the Principles of Legality

A definite limitation on State power is the historic meaning of the principle of legality²⁹. This principle is antithetical to the widely expressed positive law sentiment of – *any command of Sovereign* – and is cardinal to penal and taxation law. In tax law, it works as *limitation on penalization by the State's officials, effected by the prescription and application of specific rules.*³⁰

Article 20(1) of the Constitution imposes two limitations on retrospective application of penal laws. Making of an act an offence for the first time and then making the law retrospective, and secondly, the infliction of a penalty greater than that which might have been inflicted under the law which was in force when the act was committed is prohibited. The protection to both citizens and the non citizens, under the Constitution, from the retroactivity of law is an established fact in respect per se penal provisions but often the question arises: what about civil laws having penal liabilities? The *principle of legality* or the “rule of law”, fundamental to criminal law, also applies to taxation laws as they too have charging provisions or provisions for liabilities. In confirmation of this principle it is bad form that what was not taxable when transacted should subsequently be taxable, that what was taxable by a certain percentage when transacted should be later altered with an increased percentage, or that provisions should be applicable to an assessee's disadvantage.

CONCLUSION

Though violation of Article 14 of the Constitution and violation of Principles of Legality goes against, but the judicial interpretation left no scope to counter the validity. Moreover the absence of any Constitutional restrictions and limitations can be argued in favour of validity. For the progression of an economy sound health of industrial undertakings is imperative. Deficient and incompatible legal approaches cramp businesses and are not conducive to fair and effective administration of business. While the granting of loans and other financial assistance is the conventional manner of being sympathetic towards non-performing units, the waiving or reduction of tax by

²⁷ New Delhi Municipal Comm v. State of Punjab AIR 1997 SC 2847.

²⁸ AIR 1997 SC 1815.

²⁹ Goodhart, *Rule of Law and Absolute Sovereignty*, 106 U. Pa. L. Rev. 943 (1953) c.f. Hall, Jerome, *General Principles of Criminal Law*, 2nd edn., the Bobbs-Merrill Company. Inc., New York, p. 27.

³⁰ Permanent Court of International Justice, Series A/B, No. 65 at 53, 56 (Advisory Opinion, 1935).

retrospective application of an amendment is by far a better way. It is also profitable for the ex-chequer for the government saves more money by non-collection of tax than giving grants.

Economic growth is largely determined by the balance sheets of existing industries. And if economic development is our goal, tax reduction is the best and simplest way forward. The increasing and ‘unnecessary tax’ burden has to be scaled down to the demands of Industrialization, and retrospective tax legislation (to reduce the tax), in line with the criteria listed afore, is one way to go about it.

FIGHTING CHRONIC POVERTY, INEQUALITY AND RURAL DEVELOPMENT IN GHANA: ISSUES FOR CONSIDERATION

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Abstract: This paper contains discussions on the concept of poverty and how various writers and agencies or organisations define it. The discussions focus on the delineation of the poverty line, and author attempts to contribute to the discussions on poverty by acknowledging that essentially, poverty is dynamic and its reflections in inequality poses a danger to long term survival of society.

INTRODUCTION

Poverty implies that households or individuals are poor in some absolute sense. According to Gillis, Perkins, Roemer and Snodgrass (1987), in order to distinguish between poor and non-poor households, we can identify poverty through its manifestations like starvation, severe malnutrition, illiteracy, substandard clothing, and housing. However, poverty can also be defined socially as those who live below a minimum acceptable standard in a given time and place. In a similar manner a World Bank Group (1997), defines poverty as a lack of access to or command over the basic requirements for a minimally acceptable standard of living (US\$1/day as stipulated by the United Nations). A further elaboration is provided by Shah (2006) who states that nearly 3 billion people in the world live on less than \$2 a day, and the gross domestic product (GDP) of the 48 poorest nations is less than the wealth of the world's 3 richest people combined. Additionally, nearly a billion people entered the 21st century unable to read or write, while less than one percent of what the world spent every year on weapons was enough to put every child into school by year 2000 and yet it did not happen. Indeed some people examine poverty from the angle of individual circumstances and conclude that a person is poor if he or she has insufficient food or lacks access to some combination of basic education, skills, experience, intelligence, adequate health services, clean water, safe sanitation systems, freedom and security. According to the Maxwell School of Syracuse University (2006) factors like handicaps, age, discrimination, and sex are also contributory to poverty.

But these absolute standards aside, there is the psychological aspect of poverty-those who feel deprived of what are enjoyed by others in their societies. Poverty then becomes a relative concept in which the circumstances of individuals are compared with the circumstances of other members of their society (village, town, country). In undertaking this comparison income need not be the sole criterion. It can however, be treated as a resource that enables the satisfaction of basic needs. Other criteria like freedom and opportunities for advancement should also come into play.

The relative concept is important because the absolute poverty approach to the definition and description, involves conceptual difficulties since there is no single subsistence level which can be used as a basis for the poverty line. When we talk about basic needs for instance, it becomes obvious that the basic needs of residents in temperate climates will differ from the needs of those in the tropics. Physiology alone for instance cannot be used to determine some basic needs, because an individual's activity level can influence his or her food needs.

The definition and description of poverty also involves some dynamism. The establishment of a poverty line has to consider the particular society and time period (Atkinson, 1975). So the standards of poverty must be set against the continually moving average standards of each com-

munity. Basic needs and wants are by inference the product of historical development³¹ and depend to an extent on the degree of civilization in the society. In essence there is no single definition of poverty. We can perhaps understand the complexities better when we try to make cross-cultural, or inter-country comparisons. The absence of facilities, parks, playgrounds etc. may symbolize a level of poverty just as the lack of money is only one fact out of the complex of deprivations which make up the experience of poverty. As a contribution to the definition and description of poverty Sen (1999) identifies five dimensions, namely political space, economic space, social space, transparency, and protective security. According to him, deficits along these five dimensions limit the ability of the people to develop their capabilities and function effectively and this implies poverty. Thus poverty, apart from being a lack of income, education and access to health, also broadly implies a lack of voice, lack of empowerment, and a lack of good governance.

Yet another dimension of the discussions on poverty focuses on what are referred to as acute causes (Michigan State University, 2006). In this respect poverty is attributed to warfare, as in Darfur, Iraq and the Gaza strip, which destroys infrastructure and social services, agricultural cycles, droughts and flooding and natural disasters such as hurricanes or typhoons and earthquakes. This dimension of the debate also draws attention to entrenched factors like colonialism, centralization of power, corruption, warfare (diversion of scarce resources as in Eritrea and Ethiopia), environmental degradation and social inequality.

This paper attempts to contribute to the discussions on poverty by acknowledging that essentially, poverty is dynamic and its antecedence in inequality poses a danger to long term survival of society. The argument is that in most countries including Ghana, poverty is reflected by high inequality which in turn acts as an obstacle in reducing poverty by reducing the effect of economic growth on poverty reduction. Thus a reduction in inequality can enhance broad participation in sustainable development because people will have a sense of belongingness, share in a common future, and focus on sustainable long term goals rather than on the distractions that short term distributional issues present. Relying mostly on secondary sources, it examines chronic poverty from the angle of the rural-urban divide, gender dimension, and situates the discussions within the Ghanaian context. In this direction the paper briefly examines the disparities, their implications and the policy framework for addressing poverty. The political economy of poverty reduction and rural development is also discussed, with suggestions for policy making and action programs.

CHRONIC POVERTY

In spite of the distinction between absolute and relative poverty and the dynamics involved it is possible to observe a level of living of people in some communities in say Accra-Ghana, Sao Paolo-Brazil, Mumbai-India and other sprawling third world cities which when compared with the level of living of their fellow citizens elsewhere in the respective cities suggests some lack of basic amenities that can then be summarized as poverty. The standard of living of such citizens appears to be stagnant, regardless of the changes that are occurring in their wider communities. Such people can be described as chronically poor. For these people the deprivations seem endless. Poverty is persistent, inveterate, and has almost become part of their being. The status is transferred intergenerationally, and everywhere one looks, life is full of misery. The manifestations of poverty are seen in the presence of dirty standing waters, absence of sewage facilities,

³¹ These are attributed to Karl Marx and mentioned in Atkanson

run-down schools, inaccessible dwellings, absence of security, unkempt surroundings, looks of resignation and despair, acceptance of poverty as destined, proliferation of religious bodies, and the general powerlessness to affect their circumstances. It is almost as if, by design, the lives of such people have been reduced to a random lottery of meaningless tragedy. The stark contrasts can also be found within the rural-urban context.

RURAL -URBAN DIVIDE

While the description in the preceding paragraph concerned disparities within the urban setting there is an even more contrasting level of existence between rural folks and their urban counterparts. In many third world countries, there is a sharp distinction between rural and urban areas, with the rural sector containing most of the poor while the urban areas contain most of the articulateness, organization and power (Lipton, 1989). Resources are allocated such that within the city and the village as well as between them, urban priorities are depicted instead of the principle of equity and efficiency. Growth in many of these countries has not reflected significantly in an improvement in the living standards of the rural poor. There is also a seasonal dimension to the poverty in rural areas. Usually during the rainy season there is a simultaneous prevalence of sickness, malnutrition, indebtedness, hard work, discomfort and poor food availability. This pre-harvest period exacts a lot of stress on rural people. Even though this period is anticipated, and coping mechanisms devised, the fact that it recurs seasonally is an issue that development experts have to be concerned with.

Can we then conclude that chronic poverty in rural systems is a consequence of the urban bias in development policy? From the classical economists to Rostow's stages of growth and Lewis' dualistic (structural change) model of growth, the general direction is that surplus from the agricultural sector should be channeled into the modern industrial sector. One way of deriving surplus from the agricultural sector is to maintain low farm wages. Two kinds of inequality emerge here-the first concerns the difference between urban and rural incomes as explained by Arthur Lewis,³² while the second is in respect of the endowment and efficiency of capital for agriculture and non-agriculture respectively.

According to Ewang (1995), poverty is structural and emanates from the economic and political conditions which influence rural people's livelihoods. In order to tackle this, it is essential to develop the abilities of rural people to have a say in and to influence the forces which impact their lives. The divide between rural and urban incomes is therefore partly due to the different capital endowments, and partly to deliberate government action to depress food prices. As long as agriculture remains mostly a rural activity, the maintenance of unfavorable internal terms of trade for agriculture means that chronic poverty will exist in rural areas. Any attempts at rural development should therefore examine and balance the terms of trade for agriculture in order to make an impact on poverty. This is a basic requirement for minimizing inequalities between men and women especially since the majority of subsistence farmers are women.

GENDER AND POVERTY

Poverty in rural areas should be of particular concern especially because of the differential impact on men and women. Even though there are variations across local and national levels, it is well known that culture pre-determines the different roles that are assigned to men and women.

³² The 2 sector model focuses on both the process of labour transfer and the growth of output and employment in the modern sector. Surplus labour from the rural sector moves to modern sector where wages are a premium above the subsistence level.

This cultural determination appears undiluted with time in rural settings. Culture has been used to legitimize the different statuses, values and roles, and to justify the inequalities in gender relations, which consistently place women at a disadvantage. Whatever rights are established by law for women are negated by customary and traditional practices that prevent women from getting access to resources. In matrilineal systems for instance most family properties are controlled by men.

In rural Africa, quite often the only available activities open to women are agricultural or agriculture-related, so unfavorable conditions for agriculture invariably become unfavorable conditions for women. Consequently, a rise in poverty levels increasingly means a rise in the number of poor women (feminization of poverty). This rise in poverty is directly related to the unavailability or where available, the inadequacy of economic opportunities, inaccessibility to credit, land, education and institutional support.

Even in Botswana, which is relatively developed as far as sub-Saharan Africa is concerned, the position of women in society has not improved with time. Women are restricted in land acquisition and credit. Married women have limited rights to speak for and take full guardianship of their children; seek loans and credit facilities; and enter into contract or agreement without the explicit consent of their husbands (Osei-Hwedie, 1998). Rural women are significantly more affected by problems associated with lower social status, heavy workloads and high dependency ratio. Women's representation in the public sector jobs is also very low, and this may partly explain why female-headed households have limited access to resources. Of course the kinds of jobs they are involved in –maidservants, retailing, and other low status activities that are accompanied by low incomes make them unable to access other resources.

Essentially, when discussing rural poverty in relation to urban Africa there is a need to look beyond the usual indications like income disparities, and include literacy, access to health and medical facilities and asymmetrical power relations (Shettima, 1998). As has already been stated the rural poor, majority of whom are women, lack development enhancing resources, viable organizations and institutions to represent their interests; are exposed to the power of local money lenders and traders; are dependent and marginalized and live a life of desperation. Shettima (1998) argues that the poverty of the rural environment affects women in both specific and general ways. Specifically women are exploited because they are poor women living in the rural environment. While women may not necessarily benefit from increased incomes either at the household or community levels, the burden of poverty is pushed to them when the household or community is poor or under stress. Tradition, custom, and African culture has often been used as legitimizing discourses to exploit rural women. The challenge of women's demands for their rights and improved socio-economic conditions is often met with the counter accusation that they have abandoned their traditional responsibilities and are trying to undermine the family. This usual refrain is heard all over Ghana and does contributes to poverty and inequality in the country.

POVERTY IN GHANA

According to the Ghana Poverty Reduction Strategy Paper³³, Ghana's economy since the early 1980s has been characterized by high rates of inflation and interest rates, depreciation of the cedi, low foreign exchange reserves, large public debts and relatively low economic growth. The low growth has made it difficult to reduce poverty to acceptable levels. Expenditures on social

³³ This document was published or officially made available in February 2002. It was part of the requirements for the HIPC Initiative.

programs have not been enough to constrain poverty. A comparison of health and education expenditure levels with African averages shows that the levels are lower in Ghana, and that a disproportionate amount of these levels goes to cater for personnel emoluments and administration. The poverty reduction strategy paper also states that in the last decade Ghana experienced growing and deepening poverty, that reflected in the intensification of vulnerability and exclusion among some groups and in some areas, particularly the 3 northern regions and the Central Region. At least 40% of the people in Upper West, Upper East, Northern, Central and Eastern regions were described as living in poverty in 1999. Food crop farmers, the majority of whom are rural women, have the highest incidence of poverty and constitute 59% of the poor in Ghana. This is attributed to factors such as lack of access to markets, high cost of inputs and low level economic infrastructure.

Some of the general issues described above are broken down in the Ghana living Standards survey (GLSS 4) of October 2000, where the rural-urban divide manifests. With respect to literacy for instance, there are substantial differences between men and women and between localities. Slightly more than 6 out of every 10 men, but fewer than 4 out of every 10 women are literate. More than two-thirds of adults in urban areas are literate, but only 41% of adults are literate in rural areas. A wide range of estimates of economic activity, employment, unemployment and working conditions are also available, and it shows that for each age group the activity rates for males and females are higher in rural areas, generally, than in urban areas, yet rural poverty levels are higher than urban poverty levels. An explanation for this paradox can be found in the fact that many household members in rural areas, particularly women, spend a lot of time cooking and cleaning, and trying to obtain basic necessities like water and firewood.

In terms of housing, about 80% of urban households as compared with 19% of rural households have access to pipe borne water. More than 75% of urban households versus only 17% of rural households have electricity for lighting. While 14% of urban households have access to a flush toilet, only 2% of rural households enjoy such a facility. Food consumption patterns also differ between localities. Rural residents consume more roots and tubers, and pulses and nuts than urban residents. Rural residents also spend more on alcohol and tobacco than their urban counterparts. On the other hand urban residents consume more meat and prepared meals and spend more on cereals and cereal products, poultry and poultry products than their rural counterparts. Generally, asset ownership is higher in urban than in rural areas. Similar details about regional inequalities are provided by Abane (2008:160-178).

IMPLICATIONS OF THE DISPARITIES

The obvious gaps between rural and urban areas interlocked with unequal gender relations have a direct impact on development and poverty reduction. Pronouncements in government, public, private and academic circles all indicate that for the past, and the foreseeable future agriculture will be the mainstay of the economy. It continues to dominate economic activities in terms of employment, income and production. Linked to this dominance is the importance of the rural setting where most agricultural activities occur. The other interconnecting link is the role that women play in the rural areas and consequently in agriculture. Rural development therefore is a must, not an alternative for national development. Biases against women and rural areas are both inequitable and economically inefficient. By educating girls a lot of social benefits like reduction in teenage pregnancy, malnutrition for children, infant and maternal mortality and fertility can all be reaped. It is recognized that women are important inputs in the development process, so mainstreaming gender into poverty reduction projects is an important step in ameliorating poverty and

enhancing national development. The recognition of the private sector as an engine of growth need not sideline women. The bulk of actors in the private sector and rural areas are women so there is a need to reinforce the synergy between poverty reduction and gender. The social, institutional, and economic system must be transformed so that the rural areas and women can be moved from the informal sector and incorporated into the formal sector, in order that access to productive assets and social services can be equalized.

POLICY FRAMEWORK

In order for any policy to succeed in ameliorating chronic poverty and enhancing rural development, it must take into consideration the practical needs of rural areas, and the opportunities and constraints within the rural setting. The poverty reduction strategy paper defines poverty as unacceptable physiological and social deprivation, which may be caused or exacerbated by among others:

- 1.the lack of capacity of the poor to influence social processes, public policy choices and resource allocations
- 2.low capacities through lack of education, vocational skills, entrepreneurial abilities, poor health and poor quality of life
- 3.the disadvantaged position of women in society
- 4.exposure to risks through lack of financial, social or physical security
- 5.low levels of consumption through lack of access to capital, social assets, land and market opportunities
- 6.inadequate environmental protection; and
- 7.habits and conventions based upon superstition and myths, giving rise to anti social behavior.

The above factors capture the rural –urban as well as the gender dimensions of poverty, and the consequent priority action areas identified include among others:

- 1.small scale irrigation schemes
- 2.provision of potable water
- 3.improved access to education and health facilities in rural areas
- 4.measures to ensure equal rights for women
- 5.more equitable distribution of basic services between rural and urban environments; and
- 6.provision of safety nets and measures to rehabilitate those trapped within demeaning and anti social circumstances

As is usually the case the identification of priority action areas has been accompanied by a plethora of statements of intents, reflected in the 2002 budget which has “breaking the cycle of poverty: raising peasant farmers productivity” as one of its main themes, and the 2009 budget which also focuses on the social dimension of development and poverty mitigation. Rural development via agro- processing, private sector development and enhanced social services provision with emphasis on women and children have been continually pronounced as policy and action areas. Special initiatives have been launched in agro- processing, a social emergency fund, and livelihood empowerment programs have been established to provide short-term relief to identifiable members of groups.

IMPLEMENTING ACTION PLAN

Over the years, accessibility to land has been a problem, and increasingly more and more of marginal lands, riverbeds and other ecologically delicate zones have been brought under cultivation. While the yields from these marginal areas have not been dramatic, the unfavourable con-

sequences have been dramatic. The drying up of whole streams, and rivers, and the silting up of others such as the Kakum river in the central region and the upper basin of the Tano river in the Brong Ahafo region, the siltation and pollution of the Fosu and Chemu lagoons in Cape Coast and Tema respectively, present daily challenges for the inhabitants of these river basins and areas. Policy and actions like tree planting and enforcement of the ban on farming within specified distances of rivers and streams can help to restore biodiversity and ecological balance, and also help to provide for human needs. Failure to do so will result in further erosion of rural incomes, more resource acquisition difficulties for women, and rural areas in general, and long-term dependency on food imports with its attendant negative effects on the balance of payments. Land degradation caused by human impact lead to drought and desertification, which in turn lead to poverty and starvation. It is not by coincidence that the three northern regions and the central region which are the poorest also suffer from drought.

In the midst of the policy framework and action areas is the practice of liberalization. What has to be learnt or understood is that liberalization *per se* is not enough. According to O' Neill³⁴ (2002), it must be complemented by policies aimed at fostering private sector enterprise in order to generate increased employment and provide the basic infrastructure required by agricultural and other small-scale producers. A particularly strong correlation exists between rural and agricultural growth and poverty reduction. Government policy must promote education and training to allow the poor to compete for the type of skilled employment demanded by open markets, and facilitate more rapid adjustment to the dislocations that accompanies change by way of globalization.

Another action area that can be tackled immediately is irrigation. Traditionally, agricultural systems occurred where land was abundant. There was the practice of shifting cultivation and bush fallowing where land was used for a period and then left for a time, presumably, to allow it to regenerate its fertility. However, population expansion and the increasing pressure on land, means that land has to be managed more comprehensively and production has to be maintained if not increased within the same amount of space. Apart from having fruit trees, crop and fodder trees and windbreaks, irrigation becomes very important, especially in the northern regions where there are long periods of seasonal drought.

A development process that seeks to integrate the rural poor and women should not be based on assumption, but on research. Traditional gender roles and their relationship with social institutions are factors that have to be taken into account in deciding how economic change can be translated into new roles for women and men, and into new ideologies. That is, there has to be a sophisticated and integrated approach to the study of the dialectical relation between economy and culture. Good intentions and policies will not materialize into effective action if culture is ignored. Of what good will the social emergency fund be to women, for instance, if the ultimate decision maker is the man? The drive to lessen rural poverty has to consider the eradication of myths and traditions that subject rural dwellers to a life of resignation and despair that makes them accept their current living circumstances as divined.

The next issue that has to be addressed through research, not assumptions, is poor people's priorities. Quite often the concepts of poverty which influence policy making are those of the rich, the elite or international agencies, such as was the case with the declaration of the Millennium Development Goals (UNDP, 2000). While public pronouncements in Ghana attempt to convey that the poverty reduction strategy paper was a bottom up approach, there is very little evidence to

³⁴ Paul O'Neill is the U. S. Secretary of the treasury.

support that. The outline and specific issues were already determined and so-called participation only solicited views to clothe the outline. Invariably, the assumptions that emanated from the strategy paper and the accompanying policies emphasized income and consumption, but poor people have many criteria of well being and deprivation, and it is the policy makers or outsiders who simplify these into one or two. Asking poor people what they want, how they want it and their willingness to sacrifice for it, through primary research that follows scientific methodology will enable us to identify those wants. It may surface that aside income and consumption, independence, mobility, security and self-respect are important to the poor. In essence poor people want to survive, be secure and respected. The policy that often seeks to hand down short-term solutions also discounts the tenacity and resolve of the poor. This is demonstrated by quick fix solutions such as emergency relief and short term minimal credit. It is important to recognize that the very existence of the poor involves sacrifice. They are tenacious and can take a long term view by struggling through sacrifice to maintain the basis of their livelihood. Policy making and action should recognize this. Education to inculcate the spirit of saving, which is a long-term activity should be part of any action program. When saving is incorporated into any credit scheme, then sacrifice and ownership come into play, and with that comes respect and dignity, and sustainability of such action programs.

Strategies adopted to ameliorate poverty assume that the existence of poverty is one of simplicity and uniformity, but coping strategies of the poor themselves are varied and can be location specific. Generally, most poor people, as a coping strategy, reduce risk, increase adaptability and seek a degree of autonomy. In most rural areas and even urban settings people respond to poverty by making members of the household do different things according to their abilities and ages. Many of the hawkers in the streets of Accra, Kumasi, Tema, and Takoradi would justify their presence there as a means of supplementing their family income. Others engage in prostitution and theft, while some will sell assets, or allow the dispersal and migration of family members. Less visible options include cutting down on food intake, clothing, deferring medical expenditure, and exploiting common property resources.

The policy interventions and action areas identified in the poverty reduction strategy ignore some of these coping strategies. So the policy implication then is to look at the assumptions. Research is crucial (primary research). Enquiries into the wants and needs of the poor, an understanding of their conditions and coping mechanisms will lead us to effective interventions. From the enquiries, education or training programs aimed at teaching the rural poor to eschew mistrust and form groups to set up small rural enterprises can be implemented. Extension officers and crop scientists can be brought in to help in setting up tree seedling nurseries and wood fuel plantations, using organs of rural development and women's organizations. Quite often however, implementation of various pronounced policy goals has been found wanting due to bureaucratic inertia or absence of genuine commitment.

POLITICAL ECONOMY OF POVERTY REDUCTION AND RURAL DEVELOPMENT

Measures aimed at chronic poverty reduction and rural development cannot be devoid of the social and economic context within which they are derived. Politics, power and economics are constantly at play in policy making, and this transcends traditional principles to include the social and institutional processes through which certain groups of economic and political elites influence the allocation of scarce productive resources over time either exclusively for their own benefit or for the benefit of the larger society (Todaro, 2002).

The first issue that can be examined in this process of poverty reduction and rural development is the availability of resources. In March, 2001 the government of Ghana declared its intention to join the HIPC initiative. It applied in June and was formally accepted in July 2001³⁵. Even though Ghana has since reached the completion point, the stark reality as at January 2009 is that the country is at least still as indebted as before the HIPC declaration. The obvious fact therefore is that resources are scarce, and in a period of resource scarcity, choices have to be made and the allocation of the scarce resources among competing ends is influenced by power.

Knowledge of the gamesmanship of politics can make a group more powerful than others. Elites use knowledge power to control resources. Any government's self-interest is to stay in power and will therefore distribute resources in such a way as to achieve that. The interests of the poor will be served only to the extent that will enable the government to stay in power. Even though rural areas have always been the source of food, raw materials and most of the nation's wealth, resource allocation has always been skewed in favor of urban areas because that is where the powerful live. Poor people rarely participate in shaping their futures. The decentralization process is nothing more than an exercise because in practice the decentralized departments all take their cues from the centre. Proceeds from the HIPC initiative were to be channeled into poverty alleviation based on the programs identified in the strategy paper. Health and education were specially identified as priority areas but were the allocations to these sectors defensible vis-à-vis the allocation for the retirement of part of the national debt for instance?

The challenge from the HIV/AIDS pandemic also undermines efforts at poverty reduction. Increasing progression of the pandemic is overwhelming efforts to contain it. In rural areas and among the poor there are visible signs that it is taking a toll on the women. The efforts of government are heard in pronouncements and pontifications, not in direct actions, so far. The health sector for instance is overburdened with accidents and aids related illnesses. Treatment is often minimal due to the inadequate supply of health personnel and resources. The drugs that are standard treatment for HIV in rich countries cannot as of now be included in a package of care for the infected because of cost constraints, so the affected poor and the orphans are left at the mercy of their relatives.

It is also accepted that education is a key ingredient in the fight against poverty, a point well acknowledged in the poverty reduction strategy. However, the distribution of educational resources is skewed in favor of urban areas. From primary through secondary to tertiary levels, urban areas benefit the most from the quantity and quality of facilities. The rural poor are left to make do with make shift facilities. The best schools in the urban centers are accessible mostly to the children of the well placed in society, who use protocol admission systems, or association and alumni networks to again undue advantage, the computerized admission system notwithstanding. Where the advantages are not so obvious, they are able to "buy" admissions to the elite schools for their wards through influences by money, social networks (including alumni systems), or political power connections. So the rural poor suffer two disadvantages –one from struggling through inferior tutelage and low quality facilities, and the other from discrimination by an inconsiderate and corrupt admission systems. By their inability to again admission to elite schools, their chances for advancement become severely curtailed so their efforts to escape poverty are thwarted.

In Ghana, there is so much concentration of power and amenities in the urban areas, particularly Accra, that anyone outside the loop is rarely heard. Almost all companies and institutions have

³⁵ Ghana reached the completion point in 2005 and about \$4.5 billion of its multilateral and bilateral debts were totally forgiven.

their headquarters in Accra, so decision making regardless of the pronouncements of bottom up approaches is almost always a top –down process as Chambers (1986) explained. Those in the rural areas may as well consider themselves in a different country. One needs to travel only a few kilometers outside Accra in any direction to observe and understand the stark difference between the rural poor and the urban inhabitants. The decision makers reside in Accra; send their children to the best schools in the country or better still for them, to schools outside the country at the expense of the country's scarce foreign exchange resources. They enjoy the best of health facilities and other social amenities and consequently have no empathy for the rural poor. They make programmed visits to the rural areas especially during election periods to commission mediocre constructed facilities that they themselves will not dream of using, and add vain or deceitful promises. Commitment to reducing chronic poverty and developing the rural areas is as genuine as the current crop of African politicians is about fighting corruption. Any serious and meaningful commitment can only be reflected in integrated decision-making that considers the true interests of the poor and translates this into meaningful budgetary decisions that can be actualized.

RECOMMENDATIONS FOR POLICY -MAKING AND ACTION PROGRAMS

The first thing that needs to be understood is that even though the poor have no information, they are not necessarily ignorant of their plight. Before any policy is made and action taken, there has to be primary research, that follows all the scientific methodologies available with theory and other empirical work serving as a guide, not as a substitute. Findings from empirical work carried out elsewhere can be used to inform instrument design but ultimately each country has to be regarded as unique, desirous of specific research and policy recommendations. Scientific methodology will enable the identification, study and understanding of the causes and dimensions of poverty. This will be a valid basis for designing policy and action programs. Devoid of science, any success may be happenstance and temporary.

The next recommendation is derived from the first. Having recognized that science is important, the logical follow-up is to concentrate on science and technology as a crucial variable in the goal of reducing chronic poverty and developing the rural areas. Because the rewards from science and technology research are not immediately obvious, there is often a tendency to sidestep it and attempt solutions that show instant results. However, as experience has shown, successes are always short lived. Policy –making and action should focus on directing resources towards science and technology in particular and research in general for knowledge generation, since any good policy requires knowledge of the relevant conditions. The processes are going to be challenging with intermittent failures and successes but that is a better avenue for developing a firm basis for policy and action. Research in science and technology will help improve upon materials, methods, the production and storage processes and consequently the quality and quantity of the goods and services. Improvements in quality mean, all things equal, an improvement in welfare. Improvements in quantity mean increased availability.

The Universities, Council for Scientific and Industrial Research (CSIR), and other research bodies all have some requisite personnel but the complementary factor, that is, commitment from the government, is lacking. Persistent poverty of the majority amidst affluence by the few policy makers has tended to raise suspicions about the intent of government. Courage is therefore needed to design a science and technology policy framework that will enable the country to improve its production activities and reduce poverty. But courage should be reflected in commitment which in turn must be reflected in the budgetary allocations for science and technology. At present, Ghana ranks quite low among Sub-Saharan African countries when it comes to budgetary

allocations for science and technology research. A visit to the universities and research institutions will reveal the lack of respect for such activities. There is little or no funding at all, and whatever funding that is promised is rarely adequate or even timely. Additionally, results disseminated are rarely applied. There is instead an over reliance on policy recommendations that originate from outside the country's borders. It is time to recognize the value of local expertise and offer it the necessary motivation to help the country to progress and reduce poverty.

Another recommendation that can be immediately applied is the system of admission to our secondary and tertiary institutions. It should be based purely on merit, with special consideration given only under unusual circumstances. Improvements in the computerization of admissions³⁶ can reduce nepotism, protocol admission, bribery and sometimes-outright extortion in the process. This again requires courage and a genuine willingness to use authority to serve the general good.

The next recommendation concerns the use of credit as a way of ameliorating poverty. Research has shown that the rural poor need credit to sustain their activities. However, the credit that will be worthwhile is long-term not short-term credit. Many of them do not avail themselves of credit facilities due to fear of default. They prefer rather to borrow from non-formal sources like moneylenders often at usurious interest rates, because they can at least negotiate the period of repayment. In order to help them, programs like the Emergency Social Relief Fund must be made long-term. Instead of offering credit to individuals, the rural poor must be educated to trust in uniting their resources, forming co-operatives and accessing credit to enhance their activities. Group borrowing can be an effective instrument in exerting pressure on recalcitrant members.

The issue of health is also an aspect of poverty that should engage policy attention. The old adage "prevention is better than cure" is as valid today as it was then. It is cheaper and less stressful emotionally to educate the rural poor in particular and the population in general about the consequences of unsanitary living and unhealthy behaviour. This will require incessant announcements and pronouncements from the highest level of leadership. With regard to HIV/AIDS there should be a vivid program of education that interconnects the various consequences –on the individual, the family, the children (orphans) and the resources of the country—that ultimately undermine growth and development and efforts aimed at reducing chronic poverty.

CONCLUSION

Chronic poverty is multidimensional and undesirable in any society because it undermines stability. In Ghana rural poverty can be described as one of the direct causes of underdevelopment. The bulk of economic activity is agricultural, which in turn is rural based. Over time, the level of development of the production technologies and processes has been so deficient that what would have been positive complementary activities like extension services and credit have not succeeded in improving rural incomes. Any attempt to fight rural poverty has to be informed by primary research that follows scientific methodology and consequently provides valid and reliable results. The policy recommendations that emerge can then be implemented. However, the importance of power in the political economy, and resource allocation cannot be discounted. As a country with a significant number of the population in poverty it is advisable for policy making and action programs to eliminate nepotism, bribery, corruption, injurious networking and absence of meritocracy so that the full flowering of those individuals who make up the chronically poor is not

³⁶ This system was begun in the 2005 academic year but all is not yet settled.

stifled. It is only when policy and action are honest, objective and research based that chronic poverty can be reduced in order to facilitate rural development.

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GREENHOUSE GAS EMISSIONS INCREASING GLOBAL WARMING

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Abstract: This paper discusses the greenhouse gas emissions, which cause the global worming in the atmosphere. In the 20th century global climate change becomes more sever which is due to greenhouse gas emissions. According to International Energy Agency data, the USA and China are approximately tied and leading global emitters of greenhouse gas emissions. Together they emit approximately 40% of global CO₂ emissions, and about 35% of total greenhouse gases. The developed and developing industrialized countries together emit 90% of the global CO₂ equivalent gases. Due to global warming the ocean levels are increasing, as a result most of the coastal areas will submerge by 2050, and some insects and animals will extinct. Hence immediate steps to be taken to reduce greenhouse gas emissions to safe the future generations. The paper emphasizes on the effects of global warming and different ways to reduce greenhouse gas emissions.

INTRODUCTION

The world has realized that global warming is continually increasing due to greenhouse gas emissions. The living organisms are in dangerous position and some species has already extinct and will extinct in future if global worming can not be controlled. It is clear to environment experts of all nations that emissions of carbon dioxide (CO₂) and other greenhouse gases (GHGs) are liable to global warming. The current concentrations of GHG in space have increased since 1750 from a CO₂ equivalent of 280ppm (parts per million) to 430ppm (Stern 2007). The National Academy of Sciences (NAS) has expressed its expert opinion that concentrations of CO₂ in the atmosphere have increased and continue to increase more rapidly due to human activity (NAS 2001, 2010). The NAS cites the burning of fossil fuels is the primary source of anthropogenic CO₂ emissions. The intergovernmental Panel on Climate Change (IPCC) has expressed its expert opinion that the observed increase in global average temperatures since the mid-20th century is very likely due to the observed increase in anthropogenic GHG concentrations and the temperature has been rising most rapidly since 1970 ((IPCC 2007a and UN Foundation 2007)). After the industrial revolution the global average temperature increases about 0.76°C. The global surface temperature has increased ≈ 0.2°C per decade in the past 30 years. Global warming is now +0.6°C in the past three decades and +0.8°C in the past century, and continued warming in the first half of the 21st century is consistent with the recent rate of +0.2°C per decade.

Scientific research shows that ice losses from Antarctica and Greenland has accelerated over the last 20 years which will raise the sea level. From satellite data and climate models, scientists calculated that the two polar ice sheets are losing enough ice to raise sea levels by 1.3mm each year and scientists observed that the sea levels are rising by about 3mm per year. By 2006, the Greenland and Antarctic sheets were losing a combined mass of 475Gt (gigatons) of ice per year. If these increases continue water from the two polar ice sheets could have added 15cm to the average global sea level by 2050. So that all the nations especially developed countries must take immediate steps to reduce GHGs to a substantial level. If GHG emissions can not be controlled then the people of most of the countries will suffer for drinking water, shortage of foods and various heat related diseases. Scientists declared that some plants and animals will extinct in the 21st century due to increase global warming.

According to International Energy Agency (IEA) data (IEA 2007a), the USA and China are approximately tied and leading global emitters of GHG emissions. Together they emit approximately 40% of global CO₂ emissions, and about 35% of total GHGs. The USA is a developed

country but China is yet a developing country. In this paper we have described briefly GHG emissions of these two countries.

The aim of this paper is to grow consciousness among the people who are not aware of global warming and its severe effects. The developing and poor nations are suffering from global worming which is due to GHGs and these gases are emitting from industrialized countries. Now it is too late but not yet impossible to control GHG emissions to save the future generations.

GREENHOUSE GAS EMISSIONS

Every nation in the world has realized that global warming is due to continuous GHG emissions. The people of the whole world are suffering from the effects of global warming and are projected to suffer much more acute effects as the climate change becomes more severe. The six gases; Carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), sulphurhexafluouride (SF_6), hydrofluourocarbon (HFC) and perfluourocarbon (PFC), together constitutes six GHG emissions. These six gases briefly called carbon dioxide equivalents (CO_2e). CO_2e gases covered in the Kyoto Protocol 1997, which is an international agreement linked to the United Nations Framework Convention on Climate Change (UNFCCC). In environment science CO_2e emissions are defined as the sum of the mass emissions of each individual GHG adjusted for its global warming potential (EPA 2011). These gases are accumulating in the atmosphere then continuously are decreasing the amount of solar radiation which are reflected back into the space, and are warming the earth's climate much like a greenhouse. The GHGs traps heat with shorter wavelength from the sun and radiate back into the space with longer wavelength, as a result the temperature of the earth surface increases continuously. The current concentrations of GHG in space have increased since 1750 from a CO_2e of 280ppm to 430ppm (Stern 2007). Each GHG traps different amounts of heat and stays in atmosphere for different lengths of time. So that it is necessary to measures of global warming potential to compare between gases. The following table gives six GHGs global warming potential and atmospheric life in years (Sharma 2007).

Table 1: The global warming potential of six GHGs, (IPCC 2001).

Gas	Global Warming Potential	Atmospheric Life (years)
CO_2	1	5 to 200
CH_4	21	12
N_2O	310	114
HFC	140 to 11,700	1.4 to 260
PFC	6,500 to 9,200	10,000 to 50,000+
SF_6	23,900	3200

The potency of the greenhouse effect is radiative forcing which measures how much the gas affects the balance of heat coming in and going out of the atmosphere. Positive radiative forcing warms the surface of the earth while negative forcing cools it and expressed in watts per square meter, Wm^{-2} (IPCC 2007a). The combined radiative forcing of CO_2 , CH_4 and N_2O is $+2.30 \text{ Wm}^{-2}$ compared to the radiative forcing of solar irradiance of $+0.12 \text{ Wm}^{-2}$. Oceans have wormed from surface of the sea to up to a depth of at least 3km. It is estimated that absorbed 80% of the additional heat added to the climate. Warmer water taking more spaces of the sea than the colder water, as a result sea level is rising (Sharma 2007).

Now we illustrate the inventories of six GHGs as follows:

CO₂ is the most significant GHG for its natural high atmospheric concentration and heat-trapping abilities. CO₂ is accumulating in the atmosphere due to human activities. Pre-industrial revolution period CO₂ was at a level of 280ppm and in 2005 it is increased 35% and is reached to a level of 379ppm (IPCC 2007a).

CH₄ is present in the atmosphere very low compared to CO₂ but it is 20 times more potent per unit as a greenhouse gas (EPA 2006). In the pre-industrial period CH₄ was 715ppb (parts per billion) but in 2005 it increased 148% to reach 1774ppb (IPCC 2007a). About half of this increase is due to decomposition of wastes in landfills, natural gas systems, and enteric fermentation (EPA 2006).

N₂O is 300 times more potent than CO₂ as a heat trapping gas (EPA 2006). Pre-industrial period this gas was 270ppb but in 2005 it increases 18% to reach 319ppb (IPCC 2007a). This gas mainly produced from agricultural soil management, mobile combustion, manure management, nitric acid production and human sewage.

HFC, PFC and SF₆ group of GHGs are less present in the atmosphere but they are active contributors to climate Change (EPA 2006). These three gases have extremely high global warming potentials, and SF₆ having the highest in power among them. HFC are substitutes of ozone-depleting chemicals such as chlorofluorocarbons (CFC). PFC gases are generated as a byproduct of semi-conductor manufacturing and primary aluminum manufacturing. SF₆ is emitted from electrical transmission and distribution systems. These three gases have increased 58% in atmosphere from 1990 to 2004, due largely to the substitutions away from ozone-depleting chemicals.

NAS has expressed its expert opinion that concentrations of CO₂ in the atmosphere have increased and continue to increase more rapidly due to human activity (NAS 2001, 2010). The NAS cites the burning of fossil fuels is the primary source of anthropogenic CO₂ emissions. IPCC (2007a) has expressed its expert opinion that the observed increase in global average temperatures since the mid-20th century is very likely due to the observed increase in anthropogenic GHG concentrations and the temperature has been rising most rapidly since 1970 (UN Foundation 2007). After the industrial revolution the global average temperature increases about 0.76°C. The global surface temperature has increased ≈ 0.2°C per decade in the past 30 years. Warming is larger in the Western Equatorial Pacific than in the Eastern Equatorial Pacific over the past century. The latest report (in 2007) shows that atmospheric concentrations of CO₂ grew 80% from 1970 to 2004, and recently exceeds by far the natural range over the last 650,000 years (IPCC 2007b). Global warming is now +0.6°C in the past three decades and +0.8°C in the past century, and continued warming in the first half of the 21st century is consistent with the recent rate of +0.2°C per decade. Warming occurs over ocean areas, far from direct human effects, with warming over ocean less than over land, an expected result for a forced climate change because of the ocean's great thermal inertia (Hansen et al. 2006). About 100,000 years ago in the last intergalactic period the temperatures were 3°C to 5°C higher than the present temperature due to the differences in the orbit of the earth. As a result then the sea level was likely 4m to 6m higher than the 20th century average (IPCC 2007a). NASA and Department of Energy Scientists expressed that emission of CO₂ and other heat-trapping gases have warmed the oceans, and are leading to energy imbalance which is causing, and will continue to cause, significant warming the atmosphere, increasing the urgency of reducing CO₂ emissions. Both NAS (2010) and IPCC (2007b) expressed that humans, largely through the ever-increasing burning of fossils are changing the earth's climate.

Due to global warming some impacts have appeared already and are increasing continuously. Some of them are as follows:

- The increase of temperature on the surface of the earth, as a result plants are flowering earlier and animals are shifting their ranges due to shortage of food and water.
- The loss of Arctic ice, Antarctic ice, Greenland ice, Himalayan ice etc.
- The increase of hurricane intensity, the earth quake and tsunami in recent years.
- Melting of glaciers at an accelerated rate and related glacial lake outburst flows.
- Heat waves in the oceans and rises in sea level which caused coastal flooding.
- Destruction of habitats and extinction of widespread species, and an increasing number of plants and animals species will be at risk of extinction.
- Increase of acid rains destruct forests, insects and create various diseases in the living organisms and ocean will continue to acidify which will harming coral- forming organisms. Due to acidity of the oceans fishes, coral reefs and other living organisms are dying.
 - The loss of snow packs in various parts of the world, as a result ice-bond water supplies will decrease or run off before the usual time.
 - Harms of public health such as increased heat-related illness and the irregular smog increased respiratory related diseases.

Scientific research shows that ice loss from Antarctica and Greenland has accelerated over the last 20 years which will raise the sea level. From satellite data and climate models, scientists calculated that the two polar ice sheets are losing enough ice to raise sea levels by 1.3mm each year and scientists observed that the sea levels are rising by about 3mm per year. By 2006, the Greenland and Antarctic sheets were losing a combined mass of 475Gt (gigatons) of ice per year. If these increases continue water from the two polar ice sheets could have added 15cm to the average global sea level by 2050. A rise of similar size is expected to come from a combination of melt water from mountain glaciers and thermal expansion of sea water (Black 2011). The global warming seems to be affecting many glaciers and ice caps have declined in both hemispheres, as a result melting water raise the sea levels. On the other hand the average Artic sea ice has melted by 2.7%/decade (Sharma 2007).

It is estimated that the lower latitudes will bear a disproportionate share of the negative effects of climate change. On the other hand the higher latitudes will have some significant positive effects which may help to balance the negative impacts. Africa is one of the most vulnerable continents due to global warming. It is estimated that water stress will affect between 75 and 250 million people of Africa by 2020. The cultivable land will decrease, the rain-fed agriculture could be cut in half and fisheries must be decline. As a result almost all African countries will seriously affect food security and malnutrition (IPCC 2007b). Forests will affect by pests, diseases and fire. The citizens of most of the cities will suffer from heat waves, earthquake, tsunami, shortage of water supply and energy supply by 2020. All the countries of the world those depend on rain for cultivation, their production of crops will decrease seriously due to droughts (IPCC 2007b).

Coral reefs are very important because they act as hatcheries and nurseries for open ocean fish. They protect coastal areas from storms, and provide fish, recreation and tourism money. It is estimated that in Asia coral reef fisheries feed one billion people. The total economic value of coral is estimated about \$30 billion. Rising carbon emissions might kill off the ocean's coral reefs by 2050. Burning coal, oil and gas add CO₂ to the atmosphere and the same gas is used to produce soft drinks. As CO₂ is absorbed into the soft drinks and similarly ocean water absorbs it from the air if the air is dense with CO₂. When the CO₂ enters the ocean, it makes the water more acidic. That interferes with the ability of coral to calcify their skeletons. As a result they can no longer grow and they begin to die. The marine scientists said that global warming is seriously threaten-

ing that crucial component of the ocean biodiversity. If CO₂ emissions keep stabilize at today's levels of 380ppm, coral reefs survive mostly intact. Sea water is acidifying as CO₂ from power plants, cars, trucks and other vehicles, and factories mixes into the ocean. Acidified ocean water must be fatal to some fish eggs and larvae. IPCC (2007a) expressed that 450ppm is regarded by many climate scientists as the "tipping point" to contain rises in average temperatures to around 2°C. That is still enough to wipe out 20% to 30% of the earth's animal and plant species, and for the world's coral to be bleached, crop product will fall, and millions of people and other creatures suffer from water and food shortages. To decline in global emissions by 2020, it is particularly focused on the energy industry, where \$30 trillion of new energy investment is required over the next decade. The IPCC (IPCC 2007a) report was the social cost of carbon. The average estimate is of \$12 a ton but the estimates vary widely and up to \$90 a ton which means that for every ton of carbon produced and that is roughly equivalent to a ton of coal, which resource companies sell for around \$90 and it will cost \$12 (EPA 2010).

Methane is 20 times more powerful than CO₂ to trapping heat. A vast expanse of permafrost in Siberia and Alaska has started to melt for the first time since it formed 11,000 years ago. It is caused by the recent 3°C rise in local temperature over the past 40 years, which is more than four times the global average. Peat bogs cover an area of a million square miles (or almost a quarter of the earth's land surface) to a depth of 25 meters. This has the capacity to release billions of tons of methane trapped by ice below the surface. The whole world peat bogs store at least two trillion tons of CO₂, which is equivalent to a century of emissions from fossil fuels. It is estimated that the west Siberian bog alone contains about 70 billion tons of CH₄, a quarter of all the CH₄ stored on the land surface of the world. This is equivalent to emitting 1.7 trillion tons of CO₂, which is more GHG than has been emitted by humans in the past 200 years. Vast areas of wet peat land forests are being drained and logged in Indonesia and Malaysia. Along with the ensuing peat fires this contributes 2 billion tons of CO₂, making South-East Asia the third largest polluter in the world behind the US and China. We can easily reduce our CO₂ emissions from fossil fuels if we try but we could not reduce methane emissions once if they started to emit (NAS 2010).

Experience of hotter summer days which could increase heat related mortality, ground-level ozone concentrations, storm water runoff, and negative impacts from erosion and invasive species. Rising temperatures may increase air pollution levels, with their attendant increases in respiratory illness and death. GHG emissions and climate change pose a serious threat to the economic well-being, public health, natural resources and environment of the earth. Snow pack in summer stream flows to provide energy, municipal water supply, watershed health and irrigation. The potential rise in sea levels threatens coastal communities, increased vector-borne diseases (EPA 2010).

IPCC and NASA advised that US should target to reduce GHG emissions 20% to 30% below 1990 levels by 2020 to avoid the risks of dangerous impacts of global warming. US president Barack Obama has endorsed two targets as follows (US Climate Action Partnership 2009):

- Reducing US GHG emissions back to 1990 levels by 2020.
- Reducing US GHG emissions to 80% below 1990 levels by 2050.

2009 was actually the fifth warmest year on record as far as global temperatures were concerned. The four warmest years were, in ascending order, 2002, 2003, 2005 and 1998. The last decade was the warmest on record, followed by the 1990s and then the 1980s, so the world is definitely warming up (Betts 2010). The estimated uncertainty of global mean temperature im-

plies that year 2005 was probably the warmest year, which is based on the positive polar anomalies, especially the unusual Arctic warmth (Hansen et al. 2006).

Scientists monitoring sea ice around the high Arctic and glaciers on the world's highest mountains are detecting ominous new changes linked to the warming global climate. The Arctic's thin and salty seasonal sea ice that freezes and melts in the far north every year actually spread more widely past winters. The team of NASA scientists keeping watch over the ice by satellite expressed that the much thicker perennial ice which normally remains throughout the Arctic summer has grown much thinner and some is already melting and drifting southward as winter ends (NAS 2010).

In a related development, scientists at the World Glacier Monitoring Service, based at the University of Zurich in Switzerland, reported that some 30 major glaciers around the world are shrinking fast, which threatening to increase floods in some regions and to decrease precious water supplies in others. Swiss scientists have been tracking the world's glaciers for more than a century, and the current team is now involved to the U.N. Environment Program. They reported that "data from 30 glaciers in nine mountain ranges from Alaska, the Andes, Antarctica, the Alps and the Himalayas showed that between 2004 and 2006 the average rate of melting and thinning more than doubled". In the survey they observed that the glaciers were melting at an average rate of about a foot a year between 1980 and 1999. The rapid melting of glaciers in every mountain region indicates the serious dangers, from drinking water shortages to flash floods to decreases in available water for irrigation (NAS 2010).

The IPCC's (2007b) Synthesis Report "Summary for Policymakers" (Table SPM-6) finds that using the best estimate sensitivity stabilizing at a warming of 2°C to 2.4°C requires stabilizing CO₂ emissions in the range of 350-400ppm CO₂ or 445-495ppm CO_{2e} (IPCC 2007a). For 450ppm CO_{2e} target developed countries need to reduce their emissions 40% to below 1990 levels in 2020 and reduce the emissions 95% to still lower levels by 2050, even if developing countries make substantial reductions. At the international climate talks in Poland both the Chinese and Indian delegations told that the goal of merely returning to 1990 levels in 2020 is inadequate to fight global warming. In 2007 the EU agreed to "slash GHG emissions by 20% within 13 years unilaterally and pledged to push for an agreement with the US and other industrialized countries to cut by 30% by the same deadline".

IPCC chairman Rajendra K. Pachauri, in an interview with the Prothom Alo expresses his expert opinion about climate change as follows (The Prothom Alo 2010):

"Bangladesh is one of the greatest Δ-islands of the world. Natural calamities like flood, storm, cyclone etc. are in alarming position in this country due to global warming. Within 2050 coastal area of Bangladesh will engulf by the sea which is about two-fifth portion of the country. So Bangladesh can stress the industrialized countries to decrease GHG emissions. The temperature of air and ocean are increasing rapidly, so that ices of the different parts of the world are melting. Within the 21st century the temperature of the world will increase about $+2^{\circ}\text{C}$. As a result 20% to 30% plants and animals of the world will extinct. In annex-1, 37 developed countries are not yet economically balanced. The developing countries China, India, Brazil and South Africa are in economically backward due to poverty, low per capita income, illiteracy and unskilled human capital. So that they are not taking serious attempts to decrease GHG emissions. These developed and developing countries together emit 90% of the global CO₂ gases. Although these countries are trying to develop their economy but they may or may not success because natural calamities will harm economy much more than their expected development".

According IEA data (IEA 2007a), the USA and China are approximately tied and leading global emitters of GHG emissions. Together they emit approximately 40% of global CO₂ emissions, and about 35% of total GHGs. The USA is a developed country but China is yet a developing country. Now we describe briefly GHG emissions of the USA and China.

GREENHOUSE GAS EMISSIONS OF USA AND MITIGATION POLICIES

CO₂ emissions from energy use including transportation calculated for 83% of US GHG emissions in 2005 (EIA 2006). US GHG emissions in 2007 were 16% higher than 1990 levels so that US has to loss much of its credibility in the international community by failing to act already. The USA emits a number of different GHGs through a wide variety of activities in households and businesses. The EPA estimates that, in 2006 (EPA 2008), US emissions of GHGs amounted about 7.1 BMTCO₂e (billions metric tons CO₂e) which is 85% in the form of CO₂, 8% in the form of CH₄, 5% in the form of N₂O, and 2% in the form of other three GHGs. About 86% of those emissions were directly related to the generation and consumption of energy but the remaining 14% came from industrial and agricultural processes as diverse as the production of cement and the management of landfills, wastewater and agricultural soils. About 94% of the CO₂ was emitted directly through the combustion of fossil fuels, 40% from petroleum products, 35% from coal and 19% from natural gas.

These emissions were partially offset by the net absorption of roughly 900 MMTCO₂ (million metric tons CO₂) by the nation's forests and soils. Experts generally consider that a cap-and-trade system or a tax, both of which would give businesses and households economic incentives to reduce the production and consumption of such emissions. Experts also generally agree that because of the uncertainties that society faces about the marginal benefits and marginal costs of averting climate change, a tax on emissions would have several economic advantages over a cap-and-trade approach. All US emissions of GHGs would not be manage easily because CO₂ emissions from the combustion of fossil fuels, a significant share of the remaining 20% of US emissions, which come from a variety of relatively minor sources, which are much more difficult to monitor and would be difficult to control under either a cap-and-trade system or a carbon tax (CBO 2009).

Stolaroff (2009) shows that by considering only emissions that are released within US borders, the total share of US GHG emissions associated with products and packaging is 37%. He also shows that if we include emissions from producing goods imported into and consumed in the US products and packaging gives 44% of GHG emissions.

In Kyoto Protocol the US government agreed that between 2008 and 2012 it would limit average annual emissions of GHGs to 7% below 1990 levels. But the US government have not expressed by which technology will apply to implement Kyoto Protocol. S. 2191, the Lieberman-Warner bill, provides a useful illustration of the mechanics of a cap-and-trade system, which would have required the EPA to establish two cap-and-trade programs aimed at reducing the emission of GHGs in the US over the 2010–2050 periods. Under S. 2191, consumers of gasoline would not have needed to submit allowances for the CO₂ emitted by their cars and trucks but importers and refiners could not produce and sell the gasoline to consumers without submitting allowances, effectively bringing the consumers, the ultimate emitters increase the scarcity of gasoline, as a result raises its price. In the case of S. 2191, the number of allowances allocated under the main program would have declined from 5,775 MMTCO₂e in 2012 to 1,732 MMTCO₂e in 2050, at which point the number of allowances would be equal to about 28% of 2005 emissions in sectors covered by the program. The Low Carbon Economy Act of 2007, S. 1766, would have

established a technology accelerator payment starting at \$12 per metric ton of CO₂e in 2012 and rising by 5% annually thereafter (McCarl and Schneider 1999).

In USA N₂O emission reductions could be performing assuming relevant strategies are as follows:

- reduced nitrogen fertilizer applications,
- use of nitrification inhibitors,
- improved nitrogen nutrient management, and
- reduced nitrogen content of animal feeds.

Scientists estimated that about 0.13 MMTs of N₂O emissions need to be reduced in US in order to meet the Kyoto requirements (McCarl and Schneider 1999).

GHG EMISSION IN US TRANSPORTATION SECTOR

The 2010 US Climate Choices report by the US National Academy of Sciences (NAS 2010) makes it clear that the earth's climate is changing due to human activity. Many governments in developed countries have agreed for GHG emissions to be reduced 80% by 2050 in order to stabilize atmospheric concentrations of GHG (Greene and Plotkin 2011). The transportation creates about one-fifth of global GHG emissions. The industrialized countries emit more than developing countries. So that reducing emissions from this sector must be a key part of a global strategy to combat climate change. The U.S. transportation sector is by far the largest GHG emitter among the world's transportation sectors. It is estimated that CO₂ emissions in transportation sector of USA grow by about 10% by 2035 (EIA 2010).

The US transportation sector faces following three major challenges to take any attempt to reduce higher GHG emissions:

- The vehicle manufacturers want to make larger and more powerful vehicles instead of fuel economy.
- Any attempt to shift from petroleum fuels to lower-carbon alternatives such as hydrogen or electricity is failed, because the motorists want to use high-carbon fuels which give them excellent characteristics for transportation.
- The US population and economy are expected to continue to grow, increasing both freight and personal travel. The real Gross Domestic Product (GDP) to be doubled for growing populations additional 85 million by 2035 compared to 2008 (EIA 2010).

The US must reduce GHG emissions from the transportation sector substantially within 2050. So that the US transportation to be more energy efficient and less carbon-intensive, which reduce its GHG emissions from transportation sector. The dependence on petroleum the US transportation system makes the US economy vulnerable to significant excess economic costs on the order of hundreds of billions of dollars per year (Greene 2010). Mitigating transportation's GHG emissions can save about 70% US petroleum use (EIA 2009). To buy gasoline US loss hundreds of billions of dollars each year which effects in economic development. In only 2008 the estimated economic cost of oil dependence was half a trillion dollars (\$350 billion in wealth transfer, \$150 billion in lost GDP) (Greene and Hopson 2009). All kinds of light-, medium-, and heavy-duty highway vehicles dominate the U.S. transportation sector's energy consumption and CO₂ emissions (EIA 2009). In an EIA study shows that an economy-wide carbon cap-and-trade system a carbon price that rises from \$20 per ton of CO₂ in 2012 to \$65 per ton in 2030 falls emissions from the electric utility sector by 60% while transportation emissions fall by only 5% (EIA 2009).

The US consumes more than 10 million barrels of oil per day only moving people and goods on roads and rail throughout the country which generates more than 23% of US anthropogenic GHG emissions. In 2010, Americans drove about 3 trillion miles (Burbank and Nigro 2011). In January 2011, the Pew Center on Global Climate Change issued a report on all of the actions that can be taken by the US government across the transportation sector to save oil and reduce GHG emissions (Greene and Plotkin 2011). There are many ways to save oil and to reduce GHG emissions from transportation as follows (Burbank and Nigro 2011):

- Research need to develop energy-efficient vehicles (natural gas transit buses). Encourage users to purchase and use energy efficient vehicles. It is need to impose federal gasoline tax and other transportation user fees to reduce GHG emissions.
- It is essential to increase of low-carbon fuels and installation of electric plug-in facilities and other infrastructure to support use of low-carbon fuels. It also necessary to ethanol tax exemption and encourage purchasing of natural gas transit buses.
- Operational efficiency such as congestion reduction strategies, speed reduction, promotion of eco-driving, traveler information systems, real-time traffic management centers, adaptive traffic management etc. need to save fuel. Moreover if maximum speed is fixed in 55mph (miles per hour) then GHG emissions will decrease.
- Infrastructure Construction such as light emitting diodes traffic lights, low-carbon pavements, other low-carbon materials, energy-efficient construction practices, construction and maintenance equipment need to reduce black carbon and other emissions.

The use of oils develops the US current and future economy but GHG emissions decrease the flow of the economy.

GREENHOUSE GAS EMISSIONS OF CHINA

The emissions of CO₂ of China are very high due to the large population, inefficient strong capital investment, heavy reliance on coal and inefficient planned urbanization. The per capita income of USA is very high but that of China is very low. The GHG emissions of China are higher than the USA (Leggett, Logan and Mockey 2008). China produces about 80% of its electricity by the fossil fuel-fired technologies and it emits one-fifth of world's GHG emissions from power generation. In 2006 it has becoming the world's largest GHGs emitter. The potential investors of China are confronted with uncertainty in the design of China's future climate policy. IEA (2007b) expects that power generation in China will grow with an average 4.9% p.a. It is estimate that the installed capacity will reach 1775 GW by 2030, which is nearly as high as the current installed capacity of the US and the EU combined (Schenker 2011).

Within the period of 1979 to 2007, the Chinese economy grew at an average 9.8% p. a. China acquired \$1.5 trillion in foreign exchange resources by the end of 2007 and \$3.2 trillion foreign reserve at the end of 2011, which is the world's largest foreign reserve (The Prothom Alo 2011). So that citizens have improved their standards of living. In 2011 some economic experts claim that China is now a developed country, but yet China is a developing country. World Bank in 2005 estimated that up to 200 million people in China lived on less than \$1.25 per day. Hallding, Han and Olsson (2009) indicate that although China has large foreign reserve and rich economic development, but about half of the populations live on less than \$2 per day. So that China has not eradicated poverty and can not create field to increase per capita income which is a drawback to overcome poverty of the citizens of China. In most parts of China environ pollution has become so worst that social and political stability are at risk. In 2007 World Bank and the government of China estimated that the cost of outdoor air and water pollution to China's economy totaled

around \$100 billion per annum which is 5.8% of China's GDP (World Bank 2007). Due to GHG emission China realized the effect of warming of Climate. Recently China has observed that impacts of storm intensity, rising sea levels, decrease in agricultural productivity, shifting water availability already affecting the people of China.

Coal is the relatively cheap natural fossil energy source for China. In China Coal-fired power plants produce over 2500 TWh (terawatt-hours) electricity per year. Because of heavy reliance on coal, the electricity and heat sector is responsible for about 50% of China's CO₂ emissions from fuel combustion (IEA 2010b). In 2007, it is estimated that China coal contribution is about 70%, in petroleum is 20%, in gas is 3%, and hydroelectric and nuclear contribute 7% for its total energy needs. While the USA used petroleum about 40%, coal and natural gas provide about 25%, and nuclear and hydroelectric contributing 10% for its total energy needs. Hence China in 2007 consumed about twice as much coal each year as the USA. On the other hand China is the world's largest producer of hydroelectricity generating over 397 TWh per year, which is 16% to the total annual electricity production. China estimated in 2004 that its total GHG emissions in 2007 would be about 6100 MMTCO₂ e which is a growth of 50% in one decade. This estimation is 83% from CO₂, 12% from CH₄, 5% from N₂O, and 1% from SF₆, HFC and PFC.

We have seen that China is a leading GHG emitter, its GHG emission per capita is below than that of the USA, other industrialized countries and World average. In 2005 Chinese emission per capita were about 6 tons compare to the USA at 25 tons and Russia at 15 tons. Even China's emissions per capita are also below the world average which is 7 tons. It is observed that China's emissions per capita are lower than world average but the GHG emission intensity is highest in the world. China's emissions are about 1.4 MMTCO₂e per billion US dollars of purchasing power parities (GNI_{ppp}), Russia is about 1.33, India is at 0.98 and the USA is 0.9 MMT CO₂ e/GNI_{ppp}. Hence China's GHG intensity is about twice the world average. As China wanting to increase per capita income so that it will increase GHG emissions. These emissions can be reduced by using efficient technologies in the industrial sectors. The World Bank's World Development indicators observed that China's GHG emission intensity fell more than 66% from 1990 to 2005, the USA dropped 48% and the world average declined by 43% (Leggett, Logan and Mockey 2008).

The year 2010 marked two important milestones for China which are as follows (IEA 2010a):

- In July, 2010 the IEA reported that the energy demand of China surpassed US and become the world's largest energy consumer.
- In August, 2010 China overtakes Japan as the world's second largest economy.

GHG MITIGATION POLICIES OF CHINA

The 1992 UNFCCC supported 192 countries including China and USA to stabilize "greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system". In the UNFCCC all the countries unanimously agrees to GHG concentrations (Leggett, Logan and Mockey 2008). In Copenhagen climate change summit in December 2009, China pledged to cut carbon intensity by 40% to 45% relative to 2005 level by 2020. This commitment stressed that renewable and nuclear energy would increase up to 15% by 2020 and it would expand forest cover by 40 million hectares and forest volume by 1.3 billion cubic meters compared to 2005 (Mochizuki and Zhong 2011)

According to IEA estimations of GHG emissions of China from 1990 to 2005 the total amount of CO₂ increased from 2545 MMTCO₂ (144%) but total GHG emissions increased from

3905 MMTCO₂e to 7527 MMTCO₂e (152%), (IEA 2008). From 2006 to 2007 CO₂ emissions of China increased up to 8%. In 2005 the growth rate of population was 0.6% compared to 1.1% in 1990s which is a positive attempt to decrease GHG emissions. On the other hand from 1991 to 2005 its real GDP grew at an average 10.2% per annum and its energy growth rate was 5.6% per annum (National Bureau of Statistics China 2007). These progresses came from economic restructuring and energy efficiency improvements. Recently China has wanted to decrease electricity production from coal to control GHG emissions (Leggett, Logan and Mockey 2008). The Chinese government hopes that more than 50% energy will come from nuclear and renewable energy sources (wind, biomass, solar and hydro-electric energy) by 2050 (China Climate Change Info-Net 2008).

The Pew Centre on Global Climate Change estimated that, in 2003, the GHG emissions of China release 42% from electricity and heat made up, 21% from industry, 20% from agriculture, 9% from household and services, 5% from transportation and 3% from waste (Pew Centre on Global Climate Change 2007). China's target is 20% reduction in energy intensity between 2005 and 2010. This mandate expresses that the reductions in each year be 4%. Accordingly expected GHG emissions reduction would be 700 MMTCO₂ by 2010.

China takes an attempt to produce 16% of all energy from renewable resources by 2020. It expects that wind, solar, geothermal and tidal energy will reduce 60 MMTCO₂, biomass will reduce 30 MMTCO₂ and hydroelectricity will reduce 30 MMTCO₂ (Global Wind Energy Council 2007 and NDRC 2008).

Recently China started to build energy saving buildings and announced that new buildings constructed from 2006 to 2010, the buildings should be design in standard to energy conservation by 50%. The government of China estimated that the standards and levels for refrigerators, air conditioners, washing machines and color televisions will save 33.5 TWh and reduce greenhouse gas emissions by 11.3 MMTCO₂ by 2020 (Zhou 2008). China joins Post-Kyoto agreement and promises to stabilize CO₂ emissions on the 450ppm level to reach the two degree goal. So it has to reduce emissions until 2020 by 22% compared to the baseline. To reach the target it must reduce the share of coal-fired power plants quickly and hydro-electricity, nuclear and wind power increases their share (Schenker 2011). To develop renewable energy China invested \$36 billion in renewable energy in 2009. Its target is to produce at least 300 GW in hydropower, 180 GW in wind power and 30 GW for bio-power and to produce 10 MTs of ethanol and 2 MTs of biodiesel by 2020 (Zang 2011).

China, in 2004, set passenger vehicle fuel economy standards in step by step whose average speed will be 36 miles per gallon (mpg) in 2008. It also emphasis same conditions on trucks and agricultural vehicles. After implementation of these standards China could reduce 488 MMTCO₂ by 2030. The Chinese Ministry of finance adopted taxes on vehicles taxes on vehicles which is affected September 1, 2008. This law doubled taxes on large vehicles and reduced taxes on small vehicles. Purchasers of cars with engines above 4 liter capacity will pay a rise tax of 40%, the vehicles with engine capacity between 3 and 4 liters will rise 15% to 25%. On the other hand engines with one liter capacity will reduced from 3% to 1% (Leggett, Logan and Mockey 2008). In 2007 China has become world's largest CO₂ emitter despite its effort to scale up energy efficiency and aggressively promote renewable energy use (IEA 2007b)

GHG EMISSIONS DUE TO GLOBAL TRANSPORTATION

In China, India, Brazil and other developing countries, rapidly increasing wealth and a rising middle class, rapid urbanization, and massive additions to road infrastructure are creating enor-

mous demands for personal vehicles, public transportation and freight transportation. Personal vehicles are widely increasing as status symbols as well as being faster, more flexible and convenient, and more comfortable than public transportation . As a result, the world auto fleet increased from about 50 million vehicles to 580 million vehicles between 1950 and 1997, which is five times faster than the growth in population (Barker et al. 2007).

In Europe and Japan, high-speed trains are a part of the intercity travel with other vehicles. On the other hand bus and lower speed rail dominate intercity travel in the developing countries. Freight transportation, driven by globalization and the rapid development of industry in China, India and the other developing countries, is also a major consumer of energy, which is two-fifths of global transportation energy use (WBCSD 2004).

Forecasts to 2030 confirm that the rapid growth in transportation demand, oil use, and GHG emissions over the past few decades is expected to continue. International Energy Outlook 2009 states that without changes in ongoing trends, the transportation energy demand of the nations outside of the Organization for Economic Cooperation and Development (OECD) will grow by about 90% from 2006 to 2030, which is an annual growth rate of 2.7% (EIA 2009).

GHG EMISSIONS FROM NON-ROAD VEHICLES AND ENGINES

According to the Clean Air Act (CAA), a non-road engine is “an internal combustion engine that is not used in a motor vehicle or a vehicle used solely for competition...”. EPA’s definition of non-road vehicles and engines includes outdoor power equipment, recreational vehicles, farm and construction machinery, lawn and garden equipment, logging equipment, marine vessels, locomotives, and aircraft (EPA 2003).

Table 2: Nationwide Non-road CO₂ Emissions in 2007. Calculated by Western Environmental Law Center using EPA’s non-road emissions model.

2007 U.S. Emissions: Non-road Sector	CO ₂ tons/year	Percent Total
Agricultural Equipment	43,627,556	19.8%
Airport Equipment	1,068,325	0.5%
Commercial Equipment	18,046,747	8.2%
Construction and Mining Equipment	70,413,126	32.0%
Industrial Equipment	30,645,516	13.9%
Lawn and Garden Equipment	26,212,514	11.9%
Logging Equipment	2,117,651	1.0%
Pleasure Craft	17,399,940	7.9%
Railroad Equipment	266,237	0.1%
Recreational Equipment	10,347,620	4.7%
Total: All Categories	220,145,231	100%

EPA also employs the term “non-transportation mobile sources” to refer to a subset of non-road vehicles and engines that are mobile but not used on a traditional road system. This category includes snowmobiles, golf carts, riding lawn movers, agricultural equipment and off-road trucks and vehicles, and excludes aircraft, rail and watercraft. According to EPA, in 2007, CO₂ emissions from the non-road sector totaled 220,145,231 tons/year (table-2) in the USA.

The recent new researches demonstrate that due to the thermal inertia of the ocean and ice sheets, the climate will continue to warm for several decades, even if greenhouse gas emissions are held constant. The Bali Action Plan (2007) adopted United Nations climate conference recognizes that “deep cuts in global emissions” will be required to avoid dangerous climate change.

Specifically, it acknowledges the need for industrialized nations to GHG emissions by 25% to 40% below 1990 levels by 2020.

CONCLUSION

In this paper we have shown that GHG emissions increase global warming gradually, which results global climate change. To keep the earth living place for all creatures we have to take immediate steps for reducing GHG emissions efficiently. We also show that the USA and China must reduce GHG emissions to create pressure other nations to follow them. Both the countries have taken various steps immediately to decrease GHG emissions and will take new efficient policies in future to make the earth livable peacefully for all.

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INFORMAL MICROFINANCE AND PRIMARY HEALTH CARE IN EKITI LGA, KWARA STATE

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Abstract: Microfinance provides a promising platform to expand health access and coverage for rural poor that are mostly farmers and urban poor who are in the informal sector of the economy through organized groups. Health in rural area is accessed through primary health and community care which is the most visible and commonly used part of the health system. Using a multi regression analysis, this study examines the impact of informal microfinance on primary healthcare. The study shows that there is positive relationship between informal microfinance and primary healthcare.

INTRODUCTION

Out-of-pocket health expenditure usually increases poverty for rural and urban dwellers. One of the important contributors to the common goal of ending world poverty and diseases is microfinance. Microfinance provides a promising platform to expand health access and coverage for rural poor that are mostly farmers and urban poor who are in the informal sector of the economy through organized groups. Microfinance most especially the informal microfinance increased people access to saving that enables the household to put aside precautionary funds, which they can use in times of death and illness. This saving also provides credit to clients that suffer from prolonged related illness/diseases. Thus such savings served as an insurance cover against liability of loaness in cases of prolonged diseases like malaria fever, blindness and permanent disability. However, the best microfinance programmes can be undermined by the illness of borrowers or their family members, since microfinance provide services that safeguard family health, protect clients and their families from the shock of major health expenses. This is especially true for every poor and rural community where people are exposed to more health risks and have few options for health care. (see Substad and Cheu 1996; Goodland, Onumah and Amadi 1999; Manje, 2000; Saha and Metcalfe, 2011).

Primary health and community care is the most visible and commonly used part of the health system in rural areas. For instance, rural people with mental illness, chronic disease, post acute needs, alcohol and drug problems and younger people with physical and intellectual disabilities have variable access to publicly funded primary health and community care services across jurisdictions. This leads to fewer low birth weight infants; lower infant mortality, especially post-neonatal; few years of life lost due to suicide; few years of life lost due to all expect external causes; and higher life expectancy at all ages except at age 80. Primary health care allows for earlier detection of cancers such as colorectal cancer, breast cancer, uterine/cervical cancer, and melanoma. Primary health care involves four core principles of effective health systems, namely: universal coverage; enhanced patient-centered primary care services; strengthened community-centered public health policies; and effective health system leadership. Thus, the philosophy of

primary health care service includes a holistic understanding of health; recognition of multiple determinants of health; community control over health services; health promotion and disease prevention; equity in health care; research-based methods; accessible, acceptable, and affordable technology. (see Starfield, 2002; Swerissen, 2004; Starfield 2008; WHO, 2008; UNSW, 2010).

In Bolivia, microfinance institutions offer financial products and other services that improve access to actual healthcare services and medicines. For instance, women have regular access to regular check-ups to prevent problems or diagnose them early. If treatment is needed, such women access health loans, health savings or linkages to pay for the service through their microfinance institutions. Besides, microfinance provides a platform for extending health coverage through India's national health insurance programs, by increasing access to health services through awareness generation, creating linkages with health providers, and provision of financing mechanisms such as health loans or health savings plans that can support or supplement health insurance programs. Thus, countries with health care that is organized around tenet of primary health care produce a higher level of health outcomes that includes reduction in total mortality rate, heart disease mortality rates, and infant mortality (See Swerissen, 2004; Starfield, Shi and Micinko, 2005; Starfield, 2008; Rivo, 2008).

In Nigeria, the health sector is principally financed by the government. But the government is faced with various challenges – a stagnant mono-cultural economy that depends on crude oil as a single export commodity; rapid population growth, political instability; non-existence rural workforce policies and strategies; inadequate number of health staff with skills appropriate to the health priorities of rural areas; poor maintenance of equipment; diminishing confidence in public sector health facilities, etc, as well as the spartan living conditions in rural areas. All these made health care services inaccessible to the rural people. This assertion concord with World Health Organization (WHO)'s World Health Report 2006 observation of an unmet health needs in rural and remote regions of Nigeria. (see Adesina, 2009; Awofeso, 2010; Ijaiya, *et al*, 2008; Ijaiya, *et al*, 2009; WHO, 2008; UNDP, 2009; UNDP, 2007).

Thus, an alternative source of health financing is inevitable. Informal microfinance, because of its proximity and other characteristics, provides a platform to expand health access to the rural poor through the provision of credit that offers opportunities to travel and procure medicals to meet the rural dwellers health challenges. Besides, adding health to microfinance can improve health and financial security of clients which holds a great potential for improving the overall health of microfinance institutions. Thus the role of informal microfinance in primary health care services in Ekiti LGA of Kwara State.

The rest of the paper is structured as follows. The next section examines the study area, materials and methods. Section three presents and discusses the results. The recommendations and conclusion are presented in the last section.

STUDY AREA, MATERIALS AND METHODS

Study Area

Ekiti Local Government Area was carved out from the present Irepodun Local Government Area in 1991 by Ibrahim Babangida administration to bring government nearer to the people. The Local Government Area was further split into Ekiti and Oke-Ero Local Government Areas. The present Ekiti Local Government Area has a land mass of about 747 square kilometers, with a population of 54,399 people according to 2006 population census (FGN Official Gazette, 2009). The Local Government Area is located on latitude $7^{\circ} 45'$ North, and Latitude $7^{\circ} 45'$ in its Southern part. It also lies between longitude $5^{\circ} 30'$ south and 5° East in the Eastern reach. The

local Government Area shares common boundaries with Ifelodun and Edu Local Government Areas to the North, and Kogi State to the East, Oke-Ero and Irepodun Local Government Areas to the West. It also shares common boundaries with Ondo State to the South. The major towns and villages include Araromi-Opin, Osi, Eruku, Obo-Ille, Obo-Aiyegunle, Oke-Opin, Isapa, Isare, and their major occupation is farming. (see Kwara State, 2000; Ijaiya, 2010).

Materials

The materials considered for the study are informal microfinance³⁷ and primary health care³⁸. In addition to the use of secondary data, a survey aimed at generating primary data on the impact of informal microfinance on primary health care in Ekiti LGA was conducted between November 2008 and March 2009. The primary data was collected through a set of questionnaire prepared by the Institute for Development Policy and Management in Microfinance Study in Sri Lanka. The choice of the questionnaire was based on its flexibility and comprehensiveness, on how clients used their savings and loans collected from the informal microfinance institutions (see Ijaiya, 2010).

Methods: Sampling Selection Techniques and Model for Analysis of Data.

Sampling Selection Techniques

A stratified sample method was used in the selection of the respondents. In order to have an unbiased selection of sample, four villages³⁹ were randomly selected from the local government areas based on their proximity, socio-cultural and economic variations. Each village saved as our sample unit⁴⁰. In accordance to these sample units, a structured questionnaire was distributed to 50 members of the informal microfinance after a pre-field work visit to identify members of the informal microfinance in each village. This brings the total number of respondents in the LGA to 200 respondents. The questions raised in the questionnaire include background of the respondents, in terms of gender, age, occupation, educational status, household size, etc, and average monthly savings, average amount received as loans, utilization of loan like economic activities, purchase of house or building, for finance of health and education, problems encountered etc, in the last 12 months.

Model for Analysis of Data

Both qualitative and quantitative methods were used in analyzing the data collected for this study. The qualitative analysis, which was based on perception of the rural dwellers, was used to determine the impact of informal microfinance or primary health care (i.e. clients' health care) in the villages under study. The quantitative method comprises the use of descriptive statistics and a multiple regression analysis. The descriptive statistic such as, percentile was used in describing

³⁷ Informal microfinance is the provision of financial services to low-income clients or solidarity lending groups including consumers and the self-employed who traditionally lack access to banking and related services. Microfinance is also broadly defined as a movement whose object is a world in which as many poor and near – poor households as possible have permanent access to an appropriate range of high quality financial services and financial needs. The financial services include not only credit but also savings, insurance and funds transfer. The financial needs includes the several types of needs of the poor such as (i)lifecycle needs like weddings, funeral, childbirth, education, homebuilding, widowhood, old age etc; (ii) personal emergencies such as sickness, injury, unemployment, theft, harassment or death; (iii) disasters like fires, floods, cyclones, and man-made events like war or bulldozing of dwellings; and (iv) investment opportunities like expanding business, buying land or equipment, improving housing, securing a job (which often requires paying a large bribe), etc. (see Smith, 2002; Christen, Rosenberg and Jayadera, 2004; Rutherford, 2004)

³⁸ Primary health care is the provision of first contact, person-focused, ongoing care over time that meets the health-related needs of the people. Primary health care is primary care applied in a population, and as a population strategy, it requires the commitment of governments to develop a population – oriented set of primary care services in the context of other levels and types of services It seeks to protect and promote the health of defined communities and to address individual problem and populates health at an early stage. Primary health care services involves continuity of care, health promotion and education, integration of prevention with sick care, a concern for population as well as individual health, community involvement and the use of appropriate technology. Primary health care targets acute care, aged care, mental health, drug and alcohol, sexual assault etc. and other community based health services. (see UNSW,2010; Starfield, 2008).

³⁹ The villages are Isapa, Isare, Oke-Opin and Obo-ile

⁴⁰ The sample unit is a village with a population of between 200 and 500 people.

the socio-demographic characteristic of the respondents, as well as the nature of the informal microfinance existing in the rural areas under study. The multiple regression analysis was used in determining the extent of relationship between informal microfinance and health primary health care (health challenges) in the study area.

The relationship between informal microfinance and primary health care is predicated on the assumption that if there is a functioning private health care market, an increase in government health system expenditure may ‘crowd - out’ a private health spending i.e. a household diverts its resources towards other uses once the government increases their spending on health. However, a situation where government resources are not effectively used and doctors or nurses do not show up to work at health facilities, idle health equipment, or drugs provided by government are not distributed to patients then people would be forced to finance their health needs. Earlier, studies have linked income to health. (see Sala - i - Martin,1997; Bloom and Canniy;2003; Bloom et.al,2004; Gyimah - Brempong and Wilson, 2004, Kamiya, 2010) .

Based on the above, the model is presented as follows:

$$EAsi = f(Rmfi, VHCsi) \quad (1)$$

It also follows that:

$$Rmfi = (CFi, SFi, CDFi, SSFi) \quad (2)$$

$$\text{and } VHCsi = (Gderi, Edui, Occi, HHsi) \quad (3)$$

Substituting equations (2) and (3) into equation (1), the equation thus gives a multivariate relationship.

$$EAsi = f(CFi, SFi, CDFi, SSFi, Gderi, Edui, Occi, HHsi) \quad (4)$$

With a multiple linear relationship as:

$$EAsi = \beta_0 + \beta_1 CFi + \beta_2 SFi + \beta_3 CDFi + \beta_4 SSFi + \beta_5 Gderi + \beta_6 Edui + \beta_7 Occi + \beta_8 HHsi + U \quad (5).$$

Where:

EAsi = Public health care proxied by the income generated by individual respondents economic activities.

RMfi = facilities provided by microfinance institutions.

VHCsi = vector of household characteristics of individual respondent

CFi = the amount of credit facilities provided to an individual respondent by informal microfinance in the last 12 months.

SFi = the amount saved by an individual respondents with the informal microfinance in the last 12 months.

CDFi=combating of diseases based on the medical support or the amount provided an individual respondent to procure medicine by the informal microfinance in the last 12 months.

SSFi = the social services facilities based on the nature of social services and the amount provided an individual respondent by the informal microfinance.

Gderi = gender of head of individual household (0 for otherwise, 1 for male,)

Edui = education attained by individual head of household (0 for no school, 1 for primary, 2 for secondary, 3 for tertiary).

Occi = occupational status of individual head of household (0 for unemployed, 1 for farm activities, 2 for non-farm activities,).

HHsi = household size of individual household based on the number of people in a household.

β_0 = Intercept

$\beta_1, \beta_2, \dots, \beta_8$ = parameter estimates (or co-efficient) associated with the role of informal microfinance on health care of the rural dwellers under study.

U = error terms.

To estimate the model, a multiple regression analysis was used to test the validity of the variables under investigation. This has to do with the determination of whether or not the estimates are meaningful and statistically significant to our investigation. The model was therefore verified under two major criteria: (i) a- priori criteria which is based on the signs and magnitudes of the co-efficient of the variables under consideration; (ii) statistical criteria based on statistical theory and usually referred to as the First Order Least Square Test. The following statistical criteria were used: R-square, F-statistic and t-test. The R-square (R^2) is concerned with the overall explanatory power of the (equation) regression, the greater the R^2 the better the fit. F-statistics is used to test the overall significance of the regression analysis and the t-test is used to test the significant contribution of each independent variable. (see Koutsoyiannis, 1977; Charemza and Deadman, 1992; Oyeniyi, 1997; Asika, 2002; Araoye, 2003; Ogunbameru, 2004; Greene, 2008).

The a-priori expectations or the expected behaviour of the independent variables (C_{Fi}, S_{Fi}, CDF_i, SsF_i, Gdr, Edu, Occ, HHs) on the dependent variables (EAsi) in the model are C_{Fi}>0; S_{Fi}>0; CDF_i>0; SSF_i>0; Gdri><0; Edui>0; Occi>0; HHi>0. An indication that the more the values of the independent variables the more the value of the healthcare services in the rural areas.

RESULT AND DISCUSSION

The result of the multiple regression analysis conducted at 5 per cent level of significant presented in Table 1 was based on the 174 questionnaire returned from the 200 questionnaire distributed to the respondents. The result shows that R^2 is 0.86 which means that more than 80 per cent of the variations of the dependent variables is explained by the explanatory variable. The errors terms take care of the less than 20 per cent which are variables that cannot be included in the model because of some qualitative features. The F-statistics is 10.16 which is greater than the tabulated F-statistic of 2.86 at 5 per cent level of significance. This implies that the model is useful in determining if any relationship exists between informal microfinance institutions and primary health care in Ekiti Local Government Area (LGA) of Kwara State.

Holding the vector of household characteristic constant, the co-efficient and associated t-values of the components of the facilities provided by informal microfinance institutions used in the study indicate that the amount provided to meet health challenges has the expected signs.

Statistically, it is significant at 5 per cent level. Thus, satisfies our a-prior expectations. That is, the more the fund provided as credit facilities, the more the rural dwellers have access to primary healthcare services. This finding is consistent with the findings of Substad and Cheu, 1999; Versluyzen, 1999 and 2000; Donahue, 2000; Johnson and Morduch, 2008 that clients use fund provided as credit facilities by informal microfinance to procure medicine and meet their health challenges.

Table 1: Regression Results of Primary Health Care and Informal Microfinance Institutions in Ekiti LGA, Kwara State

Explanatory variables	Co-efficient estimates and t-value
Intercept (t)	-12081.91 (-0.82)
CFi (t)	200.55 (2.14)*
β_2 CDFj (t)	3784.05 (0.31)*
β_3 Genderj (t)	320.04 (1.41)
β_4 Eduj (t)	998.97 (0.62)
β_5 Occj (t)	10.80 (0.07)
β_6 HHj (t)	2597.35 (0.98)
β_7 Agejt(t)	-2044.15 (-0.33)
β_8 Martj(t)	-457.65(-0.33)
R ²	0.86
R ² Adjusted	0.78
F-statistics	10.76
No of observations	174

Source: Author's Computations (2010). Significant at 5 per cent of significant

CONCLUSION

Given the empirical analysis of the relationship between informal microfinance and primary health care in Ekiti LGA, findings show that there is a positive relationship between informal microfinance and primary health care. Therefore, there is need to improve and sustain the activities of the informal microfinance in the rural areas so that the dwellers can have more access to funds to finance their health needs.

Base on the above, the study thus recommends that clients of the informal microfinance should ensure regular higher savings and prompt repayment of loan in order to improve and sustain the activities of informal microfinance on one hand. On the other hand, it will ensure that clients have more access to fund to meet their health needs. Besides, this would solve the problem of small credit and default among clients in the LGA.

Government should complement the activities of the informal microfinance by ensuring that drugs are available and cheap in the rural areas of Ekiti. Besides, government should recruit health staff with skills that are appropriate to the health priorities of rural areas, maintenance their poor equipments, and bring health facilities closer to the rural areas. Infrastructural facilities such as roads, electricity etc., should be provided to make the rural areas more accessible. This will reduce the money spent on travelling to receive health care.

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