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The Recognition and Determinants of Depression at a South African Primary Care Clinic

A Thesis Submitted to the
Yale University School of Medicine
in Partial Fulfillment of the Requirements for the
Degree of Doctor of Medicine

by

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2002

ABSTRACT

Depression leads to substantial morbidity and mortality on a global scale, but it is frequently underrecognized and inadequately treated in primary care settings. The detection of depression is particularly challenging in under-resourced countries. This study attempts to determine rates of recognition and treatment of depressive disorders at a community clinic in the Cape Flats, South Africa.

The diagnostic instrument PRIME-MD was administered and charts reviewed for a sample of 222 patients presenting to the Lotus River Community Health Centre. Outcomes sought were (1) the prevalence of depressive disorders and (2) rates of detection and treatment as indicated by antidepressant prescription through chart review.

The prevalence of depressive disorders in the group was found to be 32% (N=70), with 13% meeting criteria for major depressive disorder (N=29). Depressed patients tended to be younger ($p<.001$) and female ($p=.026$) and were more likely to describe somatic symptoms than were non depressed ($p<.001$). There was a statistically significant correlation between a diagnosis of depression and prescription of a tricyclic antidepressant (TCA) ($p=.028$). The sensitivity and specificity of a TCA prescription for depression were 20% and 91%, respectively. Multiple logistic regression analysis demonstrated that the strongest factor contributing to either a diagnosis of depression or a prescription of an antidepressant was the presence of somatic complaints.

In this primary care setting, patients with depressive diagnoses were reliably recognized as indicated by a significant correlation between depression and antidepressant receipt. Physicians appeared to respond primarily to somatic rather than psychological presentations. While depressed patients received antidepressants more

frequently than non-depressed, only a minority of depressed patients was recognized as such. Analyzing patterns of recognition requires an understanding not only of physician practices but also of the cultural setting of the health care system.

ACKNOWLEDGEMENTS

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INTRODUCTION

Context

Mental health disorders significantly impact the health and well being of individuals and communities on a global scale. Of the myriad conditions that comprise this group of disorders – substance dependence, mood disorders, psychoses, PTSD, to name a few – depressive disorders are unique in that they develop insidiously yet dramatically affect morbidity and may affect mortality. While many developed countries have acknowledged the importance of depression through research and policy discussions, problems of adequate recognition and appropriate treatment persist. Recently, global discourse has increasingly emphasized mental health – and depression in particular – as a formidable health challenge, and both international agencies and individual countries are mobilizing political and financial resources to confront the issue. In addition to obstacles of detection well documented by western practitioners, health care providers in many developing countries face further barriers: cultural differences, political apathy, lack of resources, and a paucity of research in the field. Determining whether global solutions parallel those of the west will entail a detailed analysis of global mental health epidemiology in the context of diverse health care delivery systems. This study will begin to address such issues for a community clinic in South Africa.

Definitions

The hallmark of depressive disorders is a change in mood or affect that causes intense emotional suffering and disrupts the rhythm of daily life. Patients with mood disorders can experience a spectrum of symptoms including decreased pleasure in life's activities, changes in sleep, energy, and appetite, and feelings of guilt or worthlessness.

The most severe consequence of depression is suicide, and as many as 15% of individuals with major depression are victims of this outcome.[1] Psychological symptoms represent the most common presentation of depression, but many patients experience the disease as a cluster of somatic symptoms such as chronic pain, fatigue, and headaches that often masks as a physical disorder.

Although patients can experience a single episode, most mood disorders are recurrent, and in some patients depressed periods alternate with manic periods (bipolar illness). Relapse after treatment is common, and long-term attention to the depressed patient is essential. The origins of depression are both genetic and social. Patients who have endured traumatic childhood experiences are more vulnerable to depression, and depression is 1.5 to 3 times more common in biological relatives.[1] In addition, episodes of major depression are often triggered by severe psychosocial stressors.

Mood disorders encompass several discrete clinical entities. Major depressive disorder (MDD) is considered by some to be the most debilitating and is the subject of the majority of research in the field. Its average age of onset is mid-20s. As outlined by the Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition (DSM-IV), major depression is a clinical diagnosis defined by the presence of five out of nine characteristic symptoms listed below:

1) Sadness or depressed mood
2) Anhedonia (diminished interest in daily life)
3) Disturbances in sleep patterns
4) Loss of energy
5) Changes in appetite
6) Feelings of worthlessness of self blame
7) Difficulty concentrating
8) Psychomotor retardation or agitation
9) Suicidal ideation

Diagnostic criteria for major depression indicate that either depressed mood or anhedonia must be present as one of the five symptoms.

Specific mood disorders also differ according to the number and time course of symptoms. Patients with partial remission of a major depressive disorder, as its name implies, do not meet criteria for major depression but have experienced an episode in the past from which they have not fully recovered. Dysthymia is a chronic disorder characterized by depressed mood more often than not over a period of at least two years' duration and is differentiated from major depression by its severity, chronicity, and persistence. Mood alteration in dysthymia negatively impacts work or social functioning. While chronic in nature, dysthymia is no less debilitating than other mood disorders. It is thought that approximately 10% of dysthymic patients will have a first episode of major depression each year.[1]

A patient who presents with a two-week period of depressed mood or anhedonia and at least two of the criteria for major depression is classified as having minor depressive disorder, or depressive disorder not otherwise specified (NOS). Of note, the terms "major" and "minor" implicated in depressive disorders refer only to the number of depressive symptoms experienced and do not reflect the severity of the disorder or the degree of impact on functioning.[2] Finally, a diagnosis of bipolar disorder indicates that the patient experiences both depressive episodes as well as manic episodes characterized by elation, over activity, and blunting of normal inhibitions.

Treatment of depression involves either pharmacological agents or psychotherapy, which have proven to be effective independently or in concert. Antidepressant classes frequently used in the treatment of depression include the

selective serotonin reuptake inhibitor (SSRIs) and the tricyclic antidepressants (TCAs).

Tricyclics represent the older class of antidepressants and include such drugs as

amitriptyline and imipramine. Pharmacological agents in this class are thought to be

effective at doses ranging from 125 to 150 mg per day, although anecdotal evidence

suggests that lower doses might be efficacious. Side effects of TCAs include

anticholinergic effects, sedation, lowered seizure threshold, and prolonged QT interval,

and overdose can be fatal. TCAs and SSRIs are thought to be equivalent in efficacy, but

physicians often choose to prescribe SSRIs if available because of a less severe side

effect profile and consequently increased tolerability.[3]

     While this study focused on depressive disorders in primary care, an

understanding of psychiatric illnesses that often coexist or co-present with depression is

instructive. Generalized anxiety disorder is characterized by persistent and excessive

worry for a period of at least 6 months with at least three other related symptoms.

Patients with anxiety disorder NOS exhibit prominent anxiety or phobic avoidance but

fail to meet criteria for another anxiety disorder. Patients with somatoform disorders

display physical symptoms suggestive of a general medical condition but not fully

explained by one; the symptoms must cause significant distress or functional impairment.

Multisomatoform disorder and somatoform NOS are differentiated by the duration of

symptoms.[1]

     While these specific criteria are useful to form a common understanding of

depression across different health care settings and cultures, many health care

practitioners invoke a broader definition of mental health. One chronicle describes a

requirement for positive symptoms: "Mental health is not simply the absence of

detectable mental disease but a state of well-being in which the individual realizes his or her own abilities, can work productively and fruitfully, and is able to contribute to his or her community."[4] An account of South Africa's mental health care policy conceptualizes mental health as the promotion of psychosocial well-being.[5] And the World Health Organization (WHO) constitution defines mental health as a "state of complete physical, mental, and social well-being."[6] Because most research focuses on the narrowest definitions of mental health, it is likely that the scope of the problem is far broader than suggested by statistics.

Epidemiology

Depression is widespread across many health care settings and populations. Prevalence rates of major depression in the United States are 10% in a one-year period and 17% over the course of a lifetime.[7] Community samples have shown point prevalence that ranges from 5% to 9% for women and 2% to 3% for men.[1] Investigators from a rural primary care practice found 10% to have depressive disorders and another 11.2% to have significant depressive symptoms without a clear diagnosis.[8] Another study showed that the prevalence of depression increases with higher levels of medical care. It is estimated that as much as 4% of the general population, 10% of primary care patients, and 14% of medical inpatients in the United States are affected by major depression.[9] Of cases of major depression, 20% are documented as severe.[7]

On an international scale, prevalence estimates of depression are consistently high, varying with location and study design. One review of international studies found that the prevalence of psychiatric disorders ranged from 17% to 24% of the general population.[10] A cross-cultural study conducted by WHO at 14 global sites found a

composite depression prevalence of 10.4%.[6] Specific studies confirm that depression is a common disorder across national boundaries. In Soweto, Johannesburg investigators in one primary care clinic found the overall prevalence of alcohol, depressive, anxiety, and adjustment disorders to be 14.38%.[11] In a group of Zimbabwean township women, 30.8% had experienced a depressive or anxiety disorder during the previous year.[12] A community study of minor psychiatric morbidity in Taiwan found prevalence rates of 18% for men and 33.3% for women.[13] Evidence indicates that depression rates have been increasing in past decades in the United States, Western Europe, Puerto Rico, Lebanon, and Taiwan.[14]

Depression also disproportionately affects certain demographic groups. Adolescent and adult women traditionally show higher rates of major depression than men, with a one-year American prevalence of 12%, versus 8% for men.[7] Lifetime risk for major depression in community samples is also significantly higher for women (10% to 25%) than for men (5% to 12%).[1] In addition, many studies have found that major depression increases with age.[15]

Although the DSM-IV states that the prevalence of major depression is thought to be unrelated to ethnicity, education, income, or marital status, individual studies have found variation in rates based on several of these factors. A community-based South African study identified six factors that correlated with depression: gender, age, marital status, employment, poverty, and education.[16] Minor depression was more common in Taiwan among women over 35, unemployed men, and individuals of a lower socioeconomic status.[13] A community survey in Pakistan found that increased age, less education, and social disadvantage were associated with psychiatric disorders and

emotional stress.[17] Results from the National Comorbidity Survey revealed that depression prevalence was higher in females, young adults, and those with less than a college education.[18] Finally, a WHO report suggested that the course of depressive disorders is altered depending on socioeconomic status, likely because of decreased access to care.[6]

Depression is associated with significant medical and psychiatric comorbidities. As many as a quarter of patients with general medical conditions such as diabetes or cardiac disease will develop major depression during the course of their illness. The disorders are mutually reinforcing; the prognosis of medical illness is less favorable in the presence of depression, and depressive episodes are longer and less responsive to treatment with concurrent medical illness.[1] It is estimated that two-thirds of patients who are depressed also meet criteria for an anxiety disorder, and there is in fact a diagnosis called mixed anxiety-depressive disorder. A study in Zimbabwe found that 65% of women with depression also had anxiety features.[12] Conversely, one study found that nearly 90% of patients with generalized anxiety disorder were concurrently diagnosed with major depression or dysthymia.[16]

Burden of disease

Untreated depressive disorders have been shown to result in substantial disability. Numerous studies show that patients who suffer from major depression experience more functional impairment in daily living than those who do not. One study of three U.S. health care provision systems found that patients with either a depressive disorder or depressive symptoms demonstrated worse physical and social functioning, worse perceived current health, and more bodily pain than did patients without chronic medical

conditions. Furthermore, this impairment was comparable to that associated with major chronic medical conditions such as hypertension, diabetes, coronary artery disease, and arthritis.[19]

On a global scale, mental health disorders are equally disabling. Depression affects 340 million people, and one in four individuals will suffer from a mental health or behavioral disorder in his or her lifetime.[6] Moreover, five of the ten leading causes of disability worldwide are psychiatric, with major depression ranking fourth.[20] Depression is the leading cause of disability worldwide in the 15 to 44 year age group, and experts predict that by 2020 it will be the second leading cause of all disability.[6] Of the one million annual deaths attributable to suicide worldwide, it is likely that half are propelled by depression.

Impact of disease can also be assessed by disability-adjusted life years (DALYs), a concept developed to quantify the burden of disease over time and measure the cost effectiveness of interventions. One DALY can be thought of as one year of healthy life. As of 2000, 12% percent of all lost DALYs was attributable to psychiatric or behavioral conditions.[6] However, most countries devote less than 1% of government expenditures to these problems.[6]

It is probable that depression is disabling because its manifestations are so intricately related to the activities of daily life. Problems with mood, interest, attention, sleep, energy, and appetite adversely impact an individual's ability to cope in almost any setting or relationship. Furthermore, changes in these areas are easily apparent to family, coworkers, or teachers. Those who work or live with a patient and do not understand

depression might perceive this change of behavior as an inability to cope or to confront life's stresses. Such misunderstanding can ultimately lead to intolerance and stigma.

In addition to its significant impact on individual functioning, depression is also associated with high medical utilization and substantial societal costs. In a study of three United States HMOs, it was found that patients with current depression or depression in remission had a significantly higher number of office visits and hospital days than non-depressed patients.[21] Furthermore, the health care system incurs costs associated with failure to recognize mental disorders in the form of resources spent exploring and treating physical symptoms that actually represent psychological diagnoses. Further studies demonstrate that cost of depression in the workplace – in terms of lost workdays and disability – is greater than that for ischemic heart disease.[6] On a global scale, the economic costs incurred from health care expenditures, lost productivity, and crime secondary to mental illness affects individuals, families, and communities. Statistics likely underestimate the actual cost since much of the impact is indirect.[6]

While depression clearly affects a large proportion of all populations, the overall burden of disease is likely higher than reported. Most prevalence studies focus on major depression and do not consider mood disorders such as dysthymia or minor depression whose chronicity or severity can render them equally or more debilitating. And the number of people who experience depressive symptoms but fall short of meeting the criteria for a mood disorder is thought to be magnitudes higher across all settings.

Challenges of recognition

Were depression easily recognized, the disability it engenders in its untreated form would be lessened. However, depression is often undetected, likely because of a

misalignment between the nature of the disorder and the system in place to detect it. While depression primarily presents in a primary care setting, most primary health care systems are not equipped to see it. Unrecognized depression translates into a missed opportunity to intervene and treat the disorder.

While specialists treat many chronic medical disorders, depressed patients are more often cared for in primary care settings than in the mental health sector. In the case of depression, it is commonly asserted that half of patients seek help from a primary care physician.[22, 23] Conversely, it is estimated that a quarter to a third of patients who present in a primary care setting have psychological symptoms.[8, 24, 25] One study that surveyed numerous countries found that in sub-Saharan Africa, Latin America and other countries, as many as one-fifth to one-third of patients have depression as the principal or secondary reason for seeking primary medical care.[26]

Yet detection rates for depression in primary care are consistently low. Studies suggest that between 18% and 50% of depressed patients are recognized as such by their primary care providers,[27] and that even fewer receive appropriate treatment. One study of medical outpatients reported a detection rate of 36% for patients with either major depression or dysthymia. In the same study, physicians misdiagnosed nearly twenty percent of non-depressed patients with either major depression or dysthymia.[28] Another study found that detection rates varied according to utilization rate. While 84% of high utilizers were accurately identified as depressed, only one third of depressed patients who did not frequently visit the clinic were recognized.[29] Furthermore, it has been found that only a minority of depressed patients receives appropriate treatment.[30] The situation is

exacerbated in developing countries; in sub-Saharan Africa and in China, treatment rates of depression are estimated to be as low as 5%.

Barriers to the detection of depression can be conceptualized by considering causes at the patient, physician, and system level. Patients frequently overlook depressive symptoms because they are considered part of normal emotional variability. Furthermore, with the exception of suicidal ideation, symptoms of depression are non-specific and are not characteristically linked to a certain disease, such as chest pain to a myocardial infarction. Patients are also less likely to report psychological symptoms because of the stigma frequently associated with mental disorders. The risks of losing employment or being barred from insurance coverage are real and often overpower an inclination to disclose symptoms.

At the physician level, challenges to diagnosing depression include lack of training and somatization of disease. Many primary care physicians are deficient in knowledge about depression and lack confidence in appropriately treating it. [23] In addition, some physicians fail to routinely screen for depression or are reluctant to broach the subject since the inquiry might lead to an uncomfortable or lengthy discussion. It has been hypothesized that some physicians purposefully avoid the topic of mental health because they feel that the resources available would be inadequate to treat the patient were positive symptoms or a diagnosis uncovered.

The diagnosis of depression is also complicated by the fact that many depressed patients present with somatic rather than psychological complaints. Studies have shown that when depression presents as physical symptoms, it is less likely to be recognized and treated appropriately. The somatic presentation of depression is subtle. Symptoms such as

pain, nausea, and headache do not fit the traditional conception of depression and are difficult to identify as such if not actively sought. The somatization of depression is also problematic because somatic symptoms are non-specific and are often linked to medical – rather than psychiatric – disorders. Physicians are trained to reflexively pursue a rule-out myocardial infarction workup for chest pain or to evaluate the potentially serious medical causes of headache. Such workup is appropriate but distracts from the possibility of other etiologies.

Barriers to diagnosing depression also occur at the level of health care delivery systems. The most commonly cited challenge to the diagnosis of depression is limited time during the patient encounter. Since depression is a clinical diagnosis that cannot be confirmed with a simple exam or laboratory test, its identification takes time and multiple encounters, commodities lacking in many primary health care systems. Furthermore, the method of financing of care can affect the ease of a diagnosis of depression.[23] Ironically, in more affluent settings, mental health may actually be less easily recognized and treated at the primary care level because of a tendency to over-rely on specialists.

Recognition of depression does not necessarily imply appropriate treatment. Patient non-compliance with medications is one of the most frequently cited reasons for treatment failure. Most often this is the result of intolerable side effects from the patient's perception. Inadequate dosing by the physician also impedes proper treatment, since sub-therapeutic regimens of appropriate antidepressants have not been found to alleviate the symptoms of depression. One study in Great Britain found that as many as 88% of prescriptions for older TCAs by primary care physicians were at doses below those outlined by consensus guidelines.[31] Finally, health care systems can adversely impact the

treatment of depression by creating narrow formularies that do not cover appropriate therapies.

In contrast, many of these barriers are notably absent in the mental health sector. Since few patients present directly to a psychiatrist, there is less of an imperative to diagnose newly presenting mental disorders. Furthermore, if an undiagnosed patient were to present with a somatic form of depression, the psychiatrist's eye would be better trained to recognize the disorder. Finally, psychiatrists enjoy the luxury of more time to spend with patients and lack the responsibility of concurrently evaluating physical diagnoses.

A global context

Fueled by an increasing recognition of the disability caused by mental illness, there has been a recent emphasis on understanding and promoting mental health at a global level. The provision of mental health care on an international scale poses unique challenges. Societal factors that adversely affect health and mental health are prevalent in many developing countries and include histories of upheaval and violence, poverty, unemployment, dislocation, inadequate education, gender discrimination, and political apathy. Furthermore, many countries lack or fail to mobilize adequate resources for medications, counseling, research, and training of health care providers. For example, it has been estimated that one third of the world's population does not have access to basic psychotropic medications.

Considerations relevant to understanding mental health care at the global level include differing forms of disease presentation, language, traditional medicine, and research priorities. Whether psychosocial distress is expressed as physical or

psychological symptoms varies according to culture and influences the health care provider's ability to predict disease. Other factors that alter the form depression takes are the degree to which guilt is a component and the extent to which paranoid features mask depression.[32]

The importance of culture is also evident in language. In contrast to many other cultures, it has been argued that western cultures prize language that differentiates among emotions, and that compartmentalization is favored over a holistic view of the body.[32] A study in a Zimbabwean township demonstrated that women described depressive episodes as "thinking too much" or "deep sadness." Somatization also played a role; grief, fear, or an insurmountable problem was often expressed as a heart complaint.[12] Another important consideration for many cultures is the reliance on traditional healers, who are often consulted before medical practitioners. Finally, research on the impact of mental health in developing countries is limited in scope, and western literature is not necessarily culturally transferable.

In their book on mental health in low-income countries, Desjarlais et. al. present a framework that highlights the challenges of mental health care in developing countries.[4] They posit that there are significant and reinforcing interactions among health problems, social pathologies, and exacerbating conditions. Depression, for example, is more prevalent and more difficult to confront in the presence of social pathologies such as substance abuse or violence and in the context of exacerbating conditions such as poverty or unemployment. Furthermore, the social problems and exacerbating conditions interact to intensify each other. Violent behavior often has its roots in conditions of unemployment or discrimination, and substance abuse frequently is tied to poverty or

limited education. When this triad of factors coexists, the result is an increase in vulnerability and a decline of welfare.

The challenge of global mental health lies in a dual threat of a surplus of devastating societal problems coupled with a lack of adequate resources; countries that confront the highest burdens of mental illness often have the fewest resources for its treatment. The urgency of the problem is reflected in recent "calls to action" for global mental health. In collaboration with the Department of Social Medicine at Harvard Medical School, WHO developed Nations for Mental Health, an initiative aimed at strengthening mental health policies and developing services that address specific country needs. WHO has also endorsed a global mental health strategy and initiated a global survey to compare the burdens of physical and mental disorders. For the first time in 2001, the annual WHO World Health Day was devoted to raising awareness of mental health.

The case of South Africa

Despite having the strongest economy and most expansive resources in sub-Saharan Africa, South Africa suffers from numerous societal problems typical of developing countries and rooted in the country's history. The unique combination of social issues that foster mental illness and the potential resources to confront such illness makes South Africa an intriguing setting in which to study depression.

The burden of suffering incurred from mental illness in South Africa is intricately tied to the country's political and social history. The apartheid system, developed in 1954 to promote the separated development of races in South Africa, propagated discrimination and created societal disparities still present today. Apartheid was officially

abolished in 1990, and in 1994 the first national elections heralded the onset of black majority rule under Nelson Mandela and the African National Congress.

During the 1990s, South African society was in transition politically and socially. While the new government has been dedicated to reversing the inequities carved out under apartheid, imbalances in income, education, employment, housing, and health care remain and have not been solved in the short term. Furthermore, in the past decade, the AIDS epidemic has threatened the health and development potential of the nation.

The social and health challenges South Africa confronts are reflected in national statistics. South Africa is a middle income, developing country. Its population of more than 43,000 speaks 11 languages and carries an 81.8% literacy rate. Blacks comprise the racial majority and represent three quarters of the population. Ethnic minority groups include white (13.6%), Coloured (8.6%) and Indian (2.6%). The unemployment rate of 30% reflects the lack of economic empowerment among disadvantaged groups and is linked to poverty and crime. It was estimated in 2000 that 50% of South Africans live below the poverty line.[33]

Health indicators in South Africa also reflect the impact of HIV/AIDS, an epidemic that claims the lives of 250,000 South Africans annually. It is estimated that nearly 20% of the adult population is infected with HIV, and approximately 4.2 million people live with the infection. Currently, the infant mortality rate is estimated to be 60.33 deaths/1000 live births and the average life expectancy 48.09 years.[33]

Evidence suggests that there is a substantial burden of mental illness in South Africa, and it is likely that the country's political and social history plays a role. According to the "mental health model" of community psychology, many mental health

problems arise from political, economic, and societal ills.[34] A study of Zimbabwean women showed that 73% attributed a specific social stressor to their depressive symptoms.[12] Given the high rates of unemployment and poverty, it makes sense that mental illness is prevalent in South Africa. Furthermore, it has been argued that apartheid itself had a profound impact on mental health,[35] and the system has even been labeled "psychiatrically pathogenic."[36]

The prevalence of clinical depression for South Africa has been reported to range from 14% to 49%.[37] While specific studies differ in health care setting, instrument, and range of psychiatric disorders assessed, most prevalence estimates fall within this range. Two community-based studies that assessed mental disorders using two stages of screening both found over one-fifth of the population to be affected. In the rural town of Mamre in the Western Cape, point prevalence of psychiatric morbidity was found to be 27.1%. Six percent of this group had anxiety disorders and 14% affective disorders, including dysthymia.[36] Researchers in an African rural community in the province of KwaZulu Natal determined a weighted prevalence of generalized anxiety and depressive disorders to be 23.9%, with the following breakdown: 3.7% generalized anxiety, 4.8% major depression, 7.3% dysthymia, and 8.2% concurrent major depression and dysthymia.[16] And a community study in nearby Lesotho that used DSM-III criteria found the rate of depression to be 12.4%.[38]

African studies have also demonstrated differences among gender, age, and education in depressed patients. One study conducted in two Ugandan villages showed that depression rates differed for women and men, with prevalence rates of 23% and 14%, respectively.[39] A more recent study of a group of low socioeconomic patients in

Pietermaritzburg, South Africa demonstrated a prevalence rate for depression of 28% and showed that depression correlated positively with age and negatively with education.[15]

Finally, analyzing depression in South Africa requires an understanding of the health care system. Under apartheid, medical services were racially segregated. Resource distribution was based on "population groups" and allocated by 14 separate departments of health. During this time, the health care system was concentrated in urban areas and funding favored tertiary care centers and private practices. In 1994 – after apartheid ended – 75% of South Africa's health budget was spent on large hospitals and academic institutions and 46% was spent on the private sector that served only 19% of the population.[40]

Mental health care was under the domain of psychiatry, but psychiatrists were scarce and unevenly dispersed. In 1989, the South African Medical and Dental Council registered 291 psychiatrists, or about 1 psychiatrist per 100,000 people.[41] For comparison, it has been estimated that Western countries average 13 psychiatrists per 100,000.[42] It is thought that the South African figure is an overestimate of the actual services available, since some practitioners chose not to practice, served only private patients, or were localized in urban centers. By 1993, little had changed; it was estimated that of the 21,000 medical practitioners in South Africa, only 250 were psychiatrists.[43] Of these few practitioners, only 7% were employed in non-metropolitan areas.[44] This uneven distribution is demonstrated by the province of KwaZulu-Natal, a region with 20% of the South African population but only 7.4% of the public sector psychiatrists.[5] Ironically, this province also has the highest prevalence of HIV.

The logical solution to the scarcity of trained psychiatrists and their urban concentration was to shift care for mental illness to the primary care sector. This shift occurred in the context of the country's transition to a democratic society and the creation of a nationalized health service based on a primary care approach. Specifically, the South African government aimed to increase the proportion of health care delivered in primary care settings, redistribute funds from hospitals and medical centers to community-based clinics, and increase the number of physicians who practiced in rural areas.[45] While mental health care under apartheid had been delivered in a vertical system emphasizing chronic mental illness, the new system favored comprehensive integrated mental health care and used psychiatrists on a referral basis.

The transition to primary mental health care has posed numerous challenges that reflect common barriers to treating mental illness in primary care. Primary health care workers, already overburdened with responsibility, might lack the ability, inclination, and time to handle mental health care.[34] When the busy primary care system does refer to a specialist, the psychiatrists in South Africa remain unevenly dispersed geographically. Low medication adherence is a problem that is likely widespread and was documented in the province of KwaZulu Natal.[5] And despite the fact that depression and anxiety account for more than 80% of conspicuous psychiatric morbidity in African clinics,[46] mental health efforts focus on psychotic disorders, often at the expense of addressing mood disorders.[15] As a result of these obstacles, studies have indicated that 80% to 96% of mental health problems in certain African settings are undetected by health workers.[47] These numbers far exceed the accepted rate of missed psychiatric diagnoses of 50% and speak to a deficiency in the system.

There is optimism, however, that barriers to primary mental health care can be overcome. One expert calls for a shift in the paradigm of care, arguing that restructuring mental health care to be delivered at the primary care level will require system changes including health promotion, empowerment of patients, and medical care that assigns importance to the subjectivity of the illness experience.[48] On a more practical level, it has been shown that short-term training of only a few hours can enhance a primary health care practitioner's ability to care for mental health, and attitudes towards delivering such care also change. Addressing the issue of a shortage of time will likely require policy changes that increase the number of front-line generalists.[34] Recent proposals have also focused on the use of primary mental health care nurses as an integral part of the delivery system.

There has also been a recent commitment to research at the policy and health care systems level in South Africa. One study assessed quality of mental health care in community- and hospital-based settings in three provinces of the country using 13 standards of care.[49] Another created a model for estimating the mental health service needs for people with severe psychiatric conditions and proposed a shift towards the development of rehabilitative staff.[50] A group in Durban developed a framework for the provision of mental health care at the district level using a 5-tiered system that employed community psychiatric nurses as district mental health program coordinators.[5]

South Africa is an appropriate and instructive country in which to study primary mental health care based on a unique confluences of characteristics: a history of social upheaval that engenders mental illness, documented prevalence of psychiatric disorders,

long-standing barriers to the provision of care, and a mental health care system in transition, with policymakers actively engaged in the process of change.

To our knowledge, the recognition and treatment of depression has not been studied in the Cape Flats region of South Africa's Western Cape. (Appendix A) The primarily Coloured[1] population lives in a community where poverty, high unemployment, violence, gang activity, and family disharmony are common. While a psychiatrist visits the clinic serving the area once a week, the primary care physician addresses most mental health problems. At the time of the study, the only class on antidepressants available was the TCAs, since SSRIs were not on the essential drug list for primary care. The social problems and mental health care delivery system are typical of many in the country and make the Cape Flats an appropriate setting in which to study depression in primary health care.

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[1] Use of the term "Coloured" originated in the South African Population Registration Act of 1950, now repealed, and connoted an individual with any one of a variety of racial origins who spoke either English or Afrikaans. It retains a descriptive value in post-apartheid South Africa, and its use in this context is not intended to impart any value judgment.

STATEMENT OF PURPOSE AND HYPOTHESIS

This study will examine the recognition and treatment of depression at a community clinic in an underserved area of South Africa. We hypothesize that as in many primary care settings, recognition rates of depression are low and many depressed patients are not being appropriately treated. In the context of this analysis, we will explore the following topics:

1) Physician prescribing patterns of antidepressants

2) Determinants of depression

3) Somatization of disease

4) Cultural dimensions of disease

5) Implications for South Africa and global mental health

METHODS

Research site

The cohort was drawn from a group of patients visiting their primary care physicians at the Lotus River Community Health Centre (LRCHC) between June 18 and July 21, 1998. The community health center, located in the Cape Flats region of South Africa's Western Cape (Appendix A), is a state clinic that provides free health care to a community of predominantly low socioeconomic status. It is one of forty such clinics that serves the Cape Town region. At the time of the research, the clinic was staffed by three full-time and four part-time physicians; each full time physician saw on average 45 patients per day. The catchment population of the Cape Flats region is predominantly Coloured (of mixed ancestry). In 1999, more than half (55%) of the population attending the clinic was unemployed.[51] The most frequent reasons for consultation at the clinic in 1999 were cough, headache, and lower back pain, and the most common diagnoses were hypertension, acute upper respiratory tract infection, asthma, and osteoarthritis.[51] Antidepressants available to patients visiting the clinic included amitriptyline and imipramine. These medications were dispensed in one-month increments.

Instrument

Prevalence of mental disorders was determined by administration of PRIME-MD (Primary Care Evaluation of Mental Disorders), a diagnostic instrument specifically designed to diagnose mental disorders in a primary care setting. Sensitivity and specificity of a self-administered version of PRIME-MD called Patient Health Questionnaire were found to be 75% and 90%, respectively, and overall accuracy was found to be 85%.[52] Of more than 1000 patients evaluated at four primary care sites, those

who had a PRIME-MD diagnosis showed greater functional impairment after correction for potential confounders.[53] The instrument has been validated in numerous populations, including 3000 obstetric-gynecologic patients,[54] patients undergoing radiation therapy,[55] and American Indians at an Indian Health Service urban clinic.[56] In addition, PRIME-MD has been tested internationally in Spain,[57, 58] Germany,[59] Denmark,[60] and Poland.[61]

PRIME-MD is composed of two sections. The one-page Patient Questionnaire consists of 25 yes/no questions intended to screen for five diagnostic areas and one question pertaining to overall health perception. Although the screening portion of the instrument is intended to be self-administered by the patient, we chose to verbally administer the questionnaire because of varying literacy rates among patients. Positive answers in certain diagnostic areas trigger the administration of specific modules within the Clinician Evaluation Guide; these modules include mood disorders, anxiety disorders, somatoform disorders, eating disorders, and alcohol abuse and dependence disorders.

For the purposes of this study, the alcohol and eating modules of PRIME-MD were excluded. In addition, the presence of bipolar disorder was not assessed, nor were depression or anxiety due to physical disorder, medication, or other drug. The physician who saw the patient on the day of the interview was responsible for completing the somatoform module. Additional data collected beyond that in PRIME-MD included age, gender, race, employment status, marital status, perception of health, and history of prescription of an antidepressant.

Design

A random sample of patients presenting to the clinic was invited to participate according to the following protocol. Patient at the clinic were sorted to see particular

physicians upon arrival to assure continuity and even workload. Each day interviews were conducted, every fifth patient visiting the clinic was selected to be interviewed according a sequential number attached to his or her chart. Patients for two physicians were followed on a given day. Data was collected by the author of this study and by one other researcher, and interviews were conducted in a private setting prior to the physician visit.

Eligibility criteria included a minimum age of 18 and the ability to speak English. Patients selected to be interviewed who met these criteria were informed of the nature of the research and the time commitment of ten to twenty minutes involved. In addition, they were presented with an information sheet detailing the goals of the study (Appendix B). Verbal informed consent was obtained prior to the beginning of the interview. For those patients who declined participation, the patient with the next sequential number on the chart was asked to participate. A total of 222 patients were interviewed. Approval was obtained from the Yale University School of Medicine Human Investigation Committee and from the University of Cape Town Ethics Committee.

Beyond the pre-determined eligibility criteria, patients were excluded from the study after completion of the interview if they were unable to thoughtfully or completely answer the questions posed, as determined by the interviewer. Three patients were excluded from the analysis because of lack of English language skills not detected in the initial screen (two patients) or lack of understanding of the interview secondary to a neurological disorder (one patient). A sample of 219 patients was used in the final analysis. To reduce variability in administration of the instrument, we limited the number of interviewers to two, and both interviewers conducted mock interviews with a

physician from the clinic prior to data collection to ensure cultural competency and consistency of administration of PRIME-MD and of interpretation of patient responses. To avoid recall bias when asking the patient about past TCA prescriptions, an actual tablet of amitriptyline and of imipramine were displayed as examples.

While diagnosis of mood and anxiety disorders could be determined by administration of PRIME-MD alone, determination of a somatoform disorder necessitated the expertise of a physician. If a patient had experienced three or more of the somatic symptoms screened for in PRIME-MD, the chart was flagged for follow-up by the appropriate physician, who would determine whether or not the symptoms could be explained by a medical condition.

Chart review was conducted the day the patient was interviewed after the patient had visited the pharmacy. Prescription of a tricyclic antidepressant (either amitriptyline or imipramine) was documented for that day and for any past visits. Information regarding rationale behind antidepressant prescription was not available.

Data analysis

Prevalence data was generated using the PRIME-MD algorithm. Raw data was discarded for a limited number of reasons. If perception of overall health fell between two categories (for example, "fair/good"), that observation was excluded from analysis. If data from patient interviews and from chart review conflicted concerning past prescription of a TCA, the data from the chart was used to document past TCA use. Several new variables were generated to aid analysis. The continuous age variable was converted to an ordinal variable consisting of five age categories. A symptom count

variable served as an alternate indicator of somatization. A summary pain variable included any patient that had responded positively to back pain, joint pain, or headache.

Statistical analysis

Statistical analysis was performed using Intercooled Stata 6.0. The student's t test was used to assess the relationship between depression status and age. A test of proportions compared age distribution and health perception among depressed and non-depressed patients. Chi-square analysis was used to determine the significance of correlations between dichotomous variables, including antidepressant prescription and depression. Multiple logistic regression analysis was employed to assess the independent effect of several independent variables on the outcomes of either TCA prescription or depression. An events to variable ratio of greater than 10 was sought for each model.

RESULTS

Demographics

Demographic characteristics of the cohort are summarized in Table 1. The
average age was 51 years (SD 17). Of all the patients interviewed, 67% were female
(95% CI 61,73), 29% were employed (95% CI 23,35), and 45% were married (95% CI
39,52). Health perception was skewed towards worse overall health, with 14% reporting
health as excellent, 16% very good, 32% good, 28% fair, and 10% poor. Twelve percent
of patients interviewed received a TCA on the day of their visit (95% CI 8,17), and 18%
of patients had been prescribed a TCA sometime in the past (95% CI 13,23). Of the 25
patients prescribed a TCA on the day of their visit, seven had never before taken one.

	All N=219	Depressed N=70	Non-depressed N=147	p	MDD N=29	Non-MDD N=189	p
Age (SD)	51 (17)	44 (16)	55 (16)	**<.001**	47 (12)	52 (17)	.0833
18-25	9.59	20	4.76	**.0004**	6.90	9.52	.6481
26-40	15.98	17.14	14.97	.6801	24.14	14.81	.2029
41-55	31.05	37.14	28.57	.2032	48.28	28.57	**.0330**
56-70	29.68	22.86	32.65	.1391	20.69	31.22	.2485
Over 70	13.7	2.86	19.05	**.0012**	0	15.87	**.0209**
Female	67.12	77.14	61.9	**.0026**	72.41	66.67	.539
Employed	29.22	32.86	27.89	.453	27.59	29.1	.867
Married	45.21	37.14	48.98	.101	44.83	45.5	.946
Health (SD)	2.97 (1.19)	2.57 (1.13)	3.15 (1.18)	**.003**	2.41 (1.34)	3.06 (1.15)	**.004**
Excellent	14.42	10.77	16.31	.2946	14.81	14.44	.9593
Very good	15.87	4.62	20.57	**.0033**	3.7	17.78	.0625
Good	31.73	29.23	33.33	.5576	14.81	34.44	**.0413**
Fair	27.88	41.54	21.28	**.0025**	40.74	25.56	.0995
Poor	10.1	13.85	8.51	.2395	25.93	7.78	.0036
Visit TCA	12.32	19.7	8.82	**.028**	25	10.34	**.029**
Past TCA	17.92	26.87	13.99	**.024**	37.93	14.84	**.003**

MDD=major depressive disorder, SD=standard deviation, TCA=tricyclic antidepressant
Standard deviation of mean in parentheses. P values derived from student's t test (for continuous age variable), test of
proportion (for age and health sub-categories), and chi square analysis (all other p values). All other data represents
percentages. Health rated on a scale of 1 to 5 with 1 being poor and 5 being excellent. P values of <.05 shown in bold.

Table 1: Characteristics of depressed patients

Characteristics of patients stratified by depression status are also summarized in Table 1. Patients who met diagnostic criteria for any depressive disorder (major depressive disorder, dysthymia, minor depression, or partial remission of major depression) are included in the column labeled "Depressed." Those categorized as Non-depressed did not meet criteria for any depressive disorder based on PRIME-MD screening.

Depressed patients tended to be younger than non-depressed by more than ten years, with an average age of 44 and 55 years, respectively (p<.001). Figure 1 shows depressed patients stratified by age group. Two age groups – the youngest and the oldest – show statistically significant differences in rates of depression. Twenty percent of depressed patients were in the 18-25 age group, compared to only 5% of non-depressed patients. This difference in proportion is statistically significant (p<.001). The proportions of patients who were depressed in the over 70-age group also show a statistically significant difference (p<01).
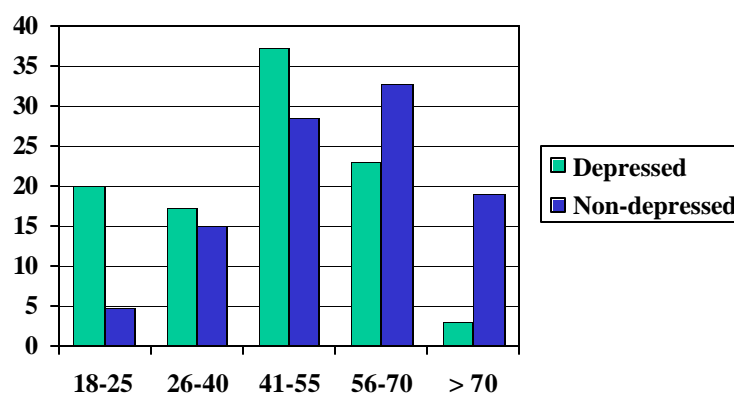
Figure 1: Stratification of depression by age

Depressed patients also differed according to gender. Females comprised 77% of depressed patients compared to 62% of non-depressed patients (p=.0026). Employment status was similar (33% vs. 28%, p=NS). There was a trend for depressed patients to be unmarried (37% vs. 49%, p=.10)

Patients who were depressed tended to have a more negative perception of their overall health than non-depressed, as shown in Figure 2. Eleven percent of depressed patients considered themselves to be in excellent health, 5% in very good health, 29% in good health, 42% in fair health, and 14% in poor health. The overall difference in health perception between depressed and non-depressed patients was significant according to chi square analysis (p=.003). When separated into individual health brackets, two groups showed statistically significant differences. The difference between the percentage of depressed and non-depressed patients who considered themselves to be in very good health was significant (p=.0033) as was that for fair health (p=.0025). It is possible that other health categories might have attained statistical significance were the sample sizes larger.
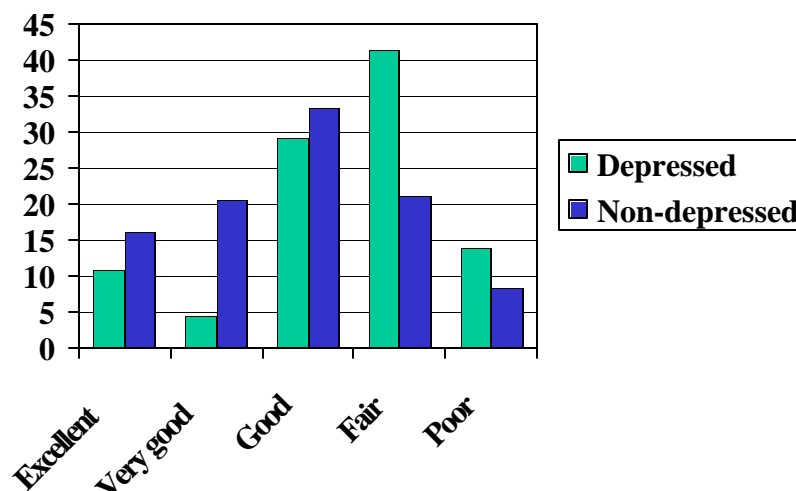
Figure 2: Stratification of depression by health perception

With several exceptions, the trends for major depressive disorder parallel those for generalized depression. There was a trend for patients with major depression to be younger (p=.083). The major depression group was equally likely to be employed (28% versus 29%) and to be married than the group without major depression. The trend of worse perception of overall health seen for depressed patients was also present for patients suffering from major depression (p=.004).

In summary, the significant demographic characteristics for depressed patients include younger age, female gender, and worse health perception. Patients with major depression also had a worse perception of their health but did not differ significantly from those unaffected in terms of age, gender, employment, or marital status.

Somatization

The assertion that psychological disorders often present as somatic complaints was substantiated in this study. Depressive disorders correlated strongly with individual somatic symptoms, as indicated by the results of the chi-square analysis outlined in Table 2. It is clear from the data that every physical symptom screened for was more common amongst depressed patients, and that most of these correlations attained statistical significance. For example, 40% of depressed patients were bothered by chest pain compared to 21% of non-depressed and 27% overall (p=.003). With the exception of menstrual irregularities, fainting, and GI symptoms, no p value exceeded .02.

Exploring mean symptom counts further validates the link between depression and somatic symptoms. While the mean symptom count approached 4.5 for all patients, depressed patients experienced on average nearly 6.5 symptoms (p<.001), and patients

with major depression averaged more than 7 (p<.001). The relationship between

symptom count and depression status is depicted graphically in Figure 3.
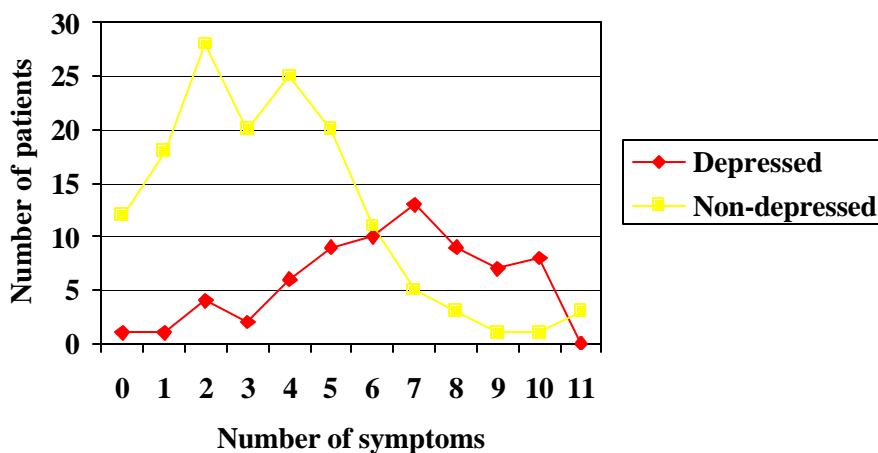
Figure 3: Symptom count and depression status

	All N=219	Depressed N=70	Non-depressed N=147	p	MDD N=29	Non-MDD N=189	p
Stomach	21.00	35.71	13.61	**<.001**	37.93	17.99	**0.013**
Back	43.84	57.14	38.10	**0.008**	65.52	40.74	**0.012**
Joint	53.88	67.14	47.62	**0.007**	65.52	52.38	0.186
Menstrual	13.61	20.37	9.89	0.077	28.57	11.11	**0.031**
Sex	5.94	11.43	3.40	**0.02**	17.24	4.23	**0.006**
HA	51.60	70.00	42.18	**<.001**	72.41	48.15	**0.015**
CP	27.40	40.00	21.09	**0.003**	48.28	23.81	**0.006**
Dizziness	26.94	38.57	21.09	**0.007**	48.28	23.81	**0.006**
Fainting	5.05	5.71	4.79	0.774	3.45	4.79	0.749
Palpitations	26.48	47.14	15.65	**<.001**	55.17	22.22	**<.001**
SOB	35.16	51.43	27.21	**<.001**	65.52	30.69	**<.001**
GI	23.29	24.29	21.77	0.678	31.03	22.22	0.297
Nausea	16.44	32.86	8.84	**<.001**	34.48	13.23	**0.004**
Fatigue	57.34	84.06	44.22	**<.001**	96.43	51.32	**<.001**
Sleep	42.01	62.86	31.97	**<.001**	75.86	36.51	**<.001**
Mean sx count	4.45	6.43	3.48	**<.001**	7.34	3.99	**<.001**

MDD=major depressive disorder, HA=headache, CP=chest pain, SOB=shortness of breath, GI=gastrointestinal, sx=symptom. A positive response indicated pain or irregularity in the specified area.
P values from chi square analysis. All other data represents percentages. P values of <.05 shown in bold.

Table 2: Somatic symptoms according to depression status

Prevalence and comorbidities

Prevalence rates of psychiatric disorders are summarized in Table 3. The overall prevalence of depressive disorders was 32% (N=70). Within this category, 13% were diagnosed with major depression (N=29), 12% with partial remission of major depression (N=25), 14% with dysthymia (N=29), and 23% with minor depression (N=51). Somatoform disorder was diagnosed in 27% of all patients interviewed (N=55), with 15% falling into the category of multisomatoform disorder (N=32, symptoms present for at least several years). A diagnosis of somatoform disorder required the presence of 3 or more symptoms. Anxiety disorders occurred with a frequency of 21% in this population (N=45). Six percent of patients suffered from panic disorder (N=13), 6% from generalized anxiety (N=13), and 12% from anxiety NOS (N=25).

	All N=219	Depressed N=70	Non-depressed N=147	p	MDD N=29	Non-MDD N=189	p
Depressive disorder	32.26	100	-	-	100	21.39	-
MDD	13.3	42.03	-	-	100	0	-
Partial remission	11.57	36.76	-	-	0	12.77	-
Dysthymia	13.62	43.94	-	-	62.96	6.45	**<.001**
Minor depression	23.39	72.86	-	-	96.55	11.70	**<.001**
Somatoform disorder	26.57	47.76	15.94	**<.001**	57.14	21.91	**<.001**
Multisomatoform	15.46	28.36	9.42	**<.001**	35.71	12.36	**.002**
Somatoform NOS	11.11	19.4	6.52	**.005**	21.43	9.55	.064
Anxiety disorder	21.33	43.75	11.03	**<.001**	65.38	15.14	**<.001**
Panic disorder	6.02	10.14	4.11	.083	20.69	3.74	**<.001**
General anxiety	6.16	14.06	2.07	**.001**	26.92	3.24	**<.001**
Anxiety NOS	11.85	23.44	6.9	**.001**	26.92	9.73	**.011**

MDD=major depressive disorder, NOS=not otherwise specified
P values from chi square analysis. All other data represents percentages. P values of <.05 shown in bold.

Table 3: Prevalence of psychiatric disorders

Concurrent psychiatric conditions occurred frequently and suggest that patients with one disorder are at higher risk for others. Patients with major depression also met criteria for dysthymia more than half the time; 63% of patients with major depression met criteria for both diagnoses, while only 6% of patients free from major depression suffered from dysthymia. Of the patients who met criteria for at least one of the depressive disorders, nearly half also met screening criteria for somatoform disorder, compared to only 16% of non-depressed patients (p<.001). Over 40% of depressed patients were also diagnosed with an anxiety disorder, versus 11% of patients without depression (p<.001). The trend is even more striking when considering patients with major depression. Nearly 60% of patients with major depression had a concurrent somatoform disorder and over 65% suffered from an anxiety disorder.

Antidepressant prescribing patterns

The primary objective of this study was to determine whether patients diagnosed as depressed by PRIME-MD were actually being recognized as such by their physicians. This question was assessed by examining the association between depression and prescription of an antidepressant. For the purposes of this study, the prescription of an antidepressant was used as a surrogate marker for a diagnosis of depression. The correlation of a diagnosis of depression and the receipt of a TCA was found to be statistically significant, indicating that physicians were in fact recognizing patients who were depressed. This finding was true for both TCA prescriptions at the time of the visit and at prior visits. The association was also valid whether considering all depressive disorders or major depression alone.

These results are summarized in Table 4. At the time of the visit, 20% of depressed patients received a TCA, while only 9% of non-depressed patients received one (p=.028). Past TCA receipt was also higher for depressed patients, with rates of 27% prior prescriptions versus 14% for non-depressed patients (p=.024).

Patients with major depression were also more likely to receive a TCA than those without the disorder. Twenty-five percent of patients with major depression received a TCA at the time of their visit, compared to only 10% of patients without the illness (p=.029). At prior visits, 38% of patients with major depression and 15% of patients without it received an antidepressant (p=.003).

	All N=219	Depressed N=70	Non-depressed N=147	p	MDD N=29	Non-MDD N=189	p
Visit TCA	12.32	19.7	8.82	.028	25	10.34	.029
Past TCA	17.92	26.87	13.99	.024	37.93	14.84	.003

MDD=major depressive disorder, TCA=tricyclic antidepressant
P values from chi square analysis. All other data represents percentages. P values of <.05 shown in bold.

Table 4: Correlation between depression and TCAs

Although there was a strong correlation between depression and treatment with a TCA, a small minority of patients who were depressed actually received an antidepressant. The ability of physicians to detect depression can be further explored by examining sensitivity and specificity (Fig. 4). The sensitivity of a TCA prescription – or the rate of prescribing TCAs when depression was present – was 20%. Conversely, the specificity – or lack of a TCA prescription when depression was absent – was 91%. The positive predictive value of a TCA prescription, or the proportion of those treated with a TCA who actually met criteria for depression, was 52%. The sensitivity and specificity of

tricyclic treatment for major depression were 25% and 90%, respectively. The positive

predictive value was 28%.

Depression			
TCA	+	-	
+	13	12	**25**
-	53	124	**177**
	66	**136**	**202**

MDD			
TCA	+	-	
+	7	18	**25**
-	21	156	**177**
	28	**174**	**202**

a	b
c	d

sensitivity = a/a+c; specificity = d/b+d; positive predictive value = a/a+b
TCA=tricyclic antidepressant, MDD=major depressive disorder

Figure 4: Two-by-two tables for depression and TCA

Positive predictive values on the order of one third to one half suggest that

physicians who prescribe TCAs are responding to more than depression. In fact, the data

indicate that many other variables correlate with antidepressant use. The results of this

analysis are outlined in Tables 5 and 6.

The correlation between antidepressant use and major depression has been

discussed. Receiving a TCA at the visit was also associated with minor depression

(p=.009), and prior TCA use was correlated with both minor depression (p=.002) and

dysthymia (p=.048). Other factors that significantly correlated with the prescription of a

TCA at the visit included gender (p=.048), somatoform disorder (p=.001), anxiety

disorders (p=.016) and panic disorder (p=.024). History of past TCA use was associated

with gender (p=.015), somatoform disorder (p=.008), and anxiety disorder (p=.036).

There was a trend for past TCA users to be female (p=.053).

	Visit TCA			Past TCA	
	chi2	p		chi2	p
Age group	3.8249	0.43		9.3269	0.053
Gender	3.9185	**0.048**		5.9222	**0.015**
Employment	0.4228	0.516		2.8285	0.093
Marital	0.0165	0.898		0.0715	0.789
Health	2.484	0.647		4.3612	0.359
Depression	4.8446	**0.028**		5.1065	**0.024**
MDD	4.7767	**0.029**		9.0363	**0.003**
Partial remission	0.1836	0.668		9.9219	0.087
Dysthymia	1.0073	0.316		3.9148	**0.048**
Minor depression	6.8691	**0.009**		9.8811	**0.002**
Somatoform	10.5864	**0.001**		7.0164	**0.008**
Multisomatoform	6.5783	**0.01**		3.1424	0.076
Somatoform NOS	2.5577	0.11		2.8194	0.093
Anxiety	5.7835	**0.016**		4.4118	**0.036**
Panic	5.1164	**0.024**		1.4765	0.224
General anxiety	1.6971	0.193		1.8191	0.177
Anxiety NOS	1.5722	0.21		1.6512	0.199

MDD=major depressive disorder, TCA=tricyclic antidepressant, NOS=not otherwise specified
P values of <.05 shown in bold.

Table 5: Chi-square analysis for antidepressant prescription patterns

Just as the diagnosis of depression bore a strong correlation to somatic symptoms,
so too did the prescription of antidepressants. As outlined in Table 6, back pain (p=.009),
joint pain (p=.019), headache, (p=.039) and sleep disturbances (p=.017) all were
significantly associated with the prescription of an antidepressant at the visit. Past TCA
use correlated significantly with back pain only (p=.007). The fact that TCA use
correlated more strongly with somatoform disorder (see Table 5) than with any individual
symptom indicates that a constellation of symptoms was most likely to trigger a
prescription.

	Visit TCA			Past TCA	
	chi2	p		chi2	p
Stomach	0.0083	0.928		0.2179	0.641
Back	6.7581	**0.009**		7.3607	**0.007**
Joint	5.4646	**0.019**		1.9817	0.159
Menstrual	1.9915	0.158		0.7286	0.393
Sex	0.1873	0.665		0.7954	0.372
HA	4.2564	**0.039**		2.356	0.125
CP	0.0024	0.961		1.0938	0.296
Dizziness	2.4043	0.121		1.0938	0.296
Fainting	1.6432	0.2		0.6251	0.429
Palpitations	1.6135	0.204		2.5897	0.108
SOB	3.1851	0.074		1.774	0.183
GI	0.3765	0.539		1.8672	0.172
Nausea	0.2161	0.642		0.0681	0.794
Fatigue	2.1673	0.141		2.1357	0.144
Sleep	5.7358	**0.017**		1.3747	0.241

TCA=tricyclic antidepressant, HA=headache, CP=chest pain, SOB=shortness of breath, GI=gastrointestinal. A positive response indicated pain or irregularity in the specified area.
P values of <.05 shown in bold.

Table 6: Chi-square analysis of somatic symptoms and TCA prescription

Multivariate analysis

Multiple logistic regression analysis was performed to determine the independent effect of several variables on the outcomes of either TCA prescription or depression. Examples of statistical output from STATA are included in Appendix C.

The factor that most strongly influenced TCA prescription was somatoform disorder. Having somatic complaints (regression coefficient=1.28) was more highly predictive than either depression (coefficient=.367) or gender (coefficient=.903). In fact, when the presence of somatoform disorder was taken into account, neither generalized depression nor major depression exhibited a statistically significant association with the prescription of an antidepressant. The only specific symptom that correlated with a prescription of a TCA was back pain (p=.045), and no single symptom approached somatoform disorder in strength of association. Interestingly, a summary variable for pain

(any patient with back, joint, or headache symptoms) had only a minimal effect on the prescription of a TCA when included in a model with depression.

Multivariate analysis shows that gender is the strongest predictor for a history of past TCA use. In a model with gender, somatoform disorder, and anxiety, depression did not have a significant impact on the outcome of past TCA use.

The second dependent variable assessed by regression analysis – depression – was most strongly predicted by age, gender, somatoform disorder, and anxiety disorder. When symptom count was included in the model, it was also a strong determinant of depression. Although health perception did not significantly impact depression in a model with somatoform and anxiety disorders, it remained an important predictor in the absence of these disorders. The regression model most predictive of depression includes four somatic symptoms. In addition to age, gender, and somatoform disorders, depression was most strongly predicted by joint pain, palpitations, nausea, and fatigue. The presence of fatigue had the greatest relative impact on the whether a patient was depressed, with a coefficient of 1.86.

In a regression model with major depression as the dependent variable, anxiety and somatoform disorders had the strongest independent effects on outcome. Symptom count was also substitutable for somatoform disorder in forecasting major depression.

Validity of methodology

Several statistical analyses were conducted to assess validity of results. Rates of depression according to interviewer were found to be similar (31.53 versus 33.02%). Rates of TCA prescription varied from 0% (N=7) to approximately 17% (N=23), depending on the prescribing physician. The differences in prescription rates, however,

were not statistically significant. Physicians did vary considerably in terms of rates of somatoform diagnoses. Percentage of patients who met criteria for somatoform disorder according to diagnosing physician varied from 3% (N=31) to 75% (N=8) (p<.001). Interpretation of these differences is limited by a lack of power.

DISCUSSION

Depressive disorders are common and debilitating but are frequently overlooked in primary care settings. Exploration of this phenomenon has been largely confined to the western literature, and until recently there has been a paucity of meaningful research on global mental health care. This study addresses the characteristics and challenges of mental health care delivery in a sub-Saharan African setting by examining the question of whether depressive disorders are appropriately recognized and treated in a primary care South African clinic. Primary outcome measures included the prevalence of depressive disorders in the clinic and rates of detection of depressive disorders as indicated by prescription of a TCA.

Recognition and treatment of depression

Physicians at the Lotus River Community Health Centre frequently detected depression when present, as indicated by the statistically significant correlation between a diagnosis of a depressive disorder and prescription of an antidepressant (p=.028). The ability of physicians to distinguish depressed patients from non-depressed during a regular office visit is also highlighted by differing crude rates of antidepressant prescription; depressed patients were more than twice as likely to be prescribed an antidepressant than were non-depressed.

Further analysis, however, reveals that although depression is being distinguished from lack of the disorder, the majority of depressed patients are in fact not prescribed TCAs. The sensitivity of TCA treatment was 20%. Unpublished data collected one year after this study from the same clinic indicates that psychiatric diagnoses were made in

only 7.6% of consultations, a figure significantly lower than predicted psychiatric prevalence in the region.[51]

Although seemingly low, such detection rates are comparable to those in other primary care settings. Many detection rates fall within the 20% to 30% range, and rates are thought to be considerably lower in Africa. As indicated earlier, it is estimated that as few as 5% of patients with mental illness in sub-Saharan Africa are appropriately treated. Such universally low recognition rates point to a problem at the system rather than provider level.

The relationship between depression and antidepressant use raises further questions with practical implications. If sensitivity is low relative to an ideal, what factors are impeding the recognition of depression? As discussed earlier, recognition of depression in a primary care setting is traditionally challenging. Stigma of mental illness, subtle presentations often highlighting somatic symptoms, and limited physician time and training all contribute to this shortcoming. In this particular study, it is also possible that some patients identified as depressed by the physician were not prescribed an antidepressant. For example, one patient was offered a TCA but declined for fear of sleeping through nighttime violence; this patient would not have been reflected in the detection rate.

The fact that the positive predictive value of a TCA prescription for depression is only 50% suggests a converse scenario: that patients were prescribed TCAs for reasons other than depression. Underlying this issue is the versatility of TCAs. This class of antidepressant has been found to be efficacious in sleep disturbances and in disorders as varied as low back pain, peptic disease, fibrositis, headache, peripheral neuropathy,

rheumatoid disease, and irritable colon; one study found that 15% of prescriptions were for non-psychiatric conditions that were TCA-responsive.[62] It is therefore possible – and probable – that physicians are prescribing antidepressants in response to symptoms other than depression. The fact that there was a significant association between the prescription of a TCA and pain or sleep symptoms makes it difficult to determine whether physicians are intending to treat somatic or psychological symptoms.

The results of the multivariate analysis help to clarify this question of physician motivations and suggest that physicians' prescribing patterns do in fact reflect recognition of factors other than depressive symptoms. The regression model indicates that the strongest factor influencing whether or not a patient is prescribed a TCA is the presence of somatoform disorder. This association of somatoform disorder and TCA prescription is so strong that it essentially nullifies the correlation between depression and TCA prescription. The finding that physicians are prescribing antidepressants based on somatic symptoms reflects a striking convergence of mood and somatic symptoms and indicates a physician awareness of this occurrence.

Regression analysis also reveals that physicians are not responding to any single symptom but rather to the presence of a number of symptoms. No individual symptom impacts the outcome of TCA prescription as strongly as somatoform disorder. Somatoform disorder also predicts TCA prescription more strongly than sleeping disturbances or a summary variable encompassing joint pain, back pain, and headache. Thus, patients who have a constellation of nonspecific symptoms are the most likely to be recognized by the physician as deserving of an antidepressant.

While prescription of a TCA at the time of the visit was influenced most strongly by somatic complaints, multivariate analysis indicates that past antidepressant use is most affected by gender. In a model assessing the relative impact of depression, gender, somatoform disorder, and anxiety, gender is in fact the only variable that remains significant. Conclusions based on this model, however, are limited by the fact that patients' psychological and physical symptoms at the time of the prescription are unknown; gender is the only variable that remains unchanged over time. It is possible that physicians were responding to other factors that could not be documented at the time of screening.

The results of the chi-square analysis for specific depressive disorders are also of interest. Both major and minor depression significantly correlate with TCA use. This finding is consistent with the fact that these diagnoses include symptoms that are both concrete and current. It is also logical that a diagnosis of partial remission of major depression would not correlate well with a prescription of an antidepressant, since symptoms have largely abated and might not present as overtly.

Interestingly, a diagnosis of dysthymia is not associated with a TCA prescription at the time of the visit, and its correlation with past TCA use approaches the limit of statistical significance. This finding might result from the nature of the disorder. Dysthymia by definition is chronic and presents in a more insidious manner than other depressive disorders. Furthermore, its long-term course might cause dysthymic symptoms to be identified as an individual's baseline personality, rendering the disorder less easily recognizable.

The strongest correlation exists between major depression and history of a prior antidepressant prescription. It is unclear why this correlation is stronger than TCA prescription at the time of the visit, but it is possible that patients who have been long-time sufferers of major depression and long-time users of antidepressants might have been more comfortable with and conversant about their symptoms during the screening interview and consequently met criteria for depression.

An essential component of an appropriate response to depression is proper treatment, including medication selection and dose. At the time the research was conducted, the only antidepressant class available to patients covered by South Africa's national formulary was the tricyclics. At Lotus River, amitriptyline was nearly universally used, usually at a dose of 25 or 50 mg per day. The fact that this dose is considered to be sub-therapeutic for the treatment of major depression raises the question of whether depressed patients were actually successfully treated.

The efficacy of low-dose TCAs for depression remains under debate. While many evidence-based studies indicate that low doses are not effective, the majority of research focuses on major depression. Anecdotal evidence from the literature and from this study, however, suggests that low doses can be effective towards relieving symptoms of depression. During an interview conducted at Lotus River, one patient recounted his emotional state and the effect of amitriptyline:

> You know it felt like you were all alone in the world and nobody was interested in your troubles…it got so bad that most probably the people thought I was trying to take my own life…you know when you're in a state like that you got no appetite and you can't sleep at night and you lay awake the whole night thinking what is going to happen…everything was closing in on me…because I lost my job already now and because of this accident my shoulder was broken and I couldn't move this arm at all. And then I thought to myself, now I can't even work you know and that really put me in a state of depression…But I must say if it wasn't for these panic tablets then I don't know if I would have coped…It calmed me completely. After I've taken the tablets, it just calms me and I could be like a normal person, you know without worrying…it helped me right through this situation.[63]

Testimonies such as this patient's suggest that antidepressant doses traditionally considered to be sub-therapeutic might in fact be conferring undetected benefit. The impact of low-dose TCA therapy for minor depression or dysthymia awaits further exploration.

Determinants of depression

While the primary objective of this study was to explore TCA prescription patterns, we also examined the determinants of depression. Understanding the common presenting features of a disorder can lead to the development of more sensitive and specific screening tools and improve rates of detection and treatment. In this group of patients presenting to a primary care South African clinic, depression was associated with being younger, female gender, worse perception of overall health, concurrent anxiety disorder, and the presence of somatic symptoms.

Although many studies have shown depression to increase with age, we found depression to be more common among younger patients. A widespread argument for depression's association with age is that older people are often less optimistic and enjoy less social support, thereby lowering the threshold for depression. It has been argued that older South Africans might be more prone to depression because they witnessed and lived through apartheid.[15] However, our findings that young people are more likely to be depressed are consistent with the fact that the young are uniquely positioned to be adversely impacted by apartheid's legacy of societal problems. Unemployment and violence endemic in many areas of Africa particularly impact the young, and challenges are exacerbated while raising a family. Furthermore, it is the young population that is

disproportionately affected by HIV/AIDS, whether in the workplace, during pregnancy, or within communities. While older South Africans are certainly not immune to the epidemic, it is the young who have never known a time free of the stigma, devastation, and daily uncertainty engendered by HIV/AIDS.

Being female also appears to predispose to depression, and this finding has been substantiated in both the western and African literature. Another distinctive feature of all depressed patients is that they perceive themselves to be in relatively poor health. The fact that this correlation holds for all depressive disorders implies that depression that is minor or chronic in nature can in fact lead to substantial functional impairment. Furthermore, there was a striking correspondence between major depression and dysthymia, indicating that many patients suffer from acute on chronic forms of depression and likely suffer greater distress.

There was also a statistically significant association between depression and anxiety disorders, a finding that has been confirmed in other studies. This concordance raises the question of whether the presence of both disorders enhances or detracts from a physician's ability to accurately diagnose either one. It is possible that a suspicion for one psychiatric disorder might encourage a physician to screen for others, especially since some of the therapeutic options overlap. Conversely, the presence of nonspecific and persistent symptoms indicative of two separate disorders might avert rather than attract physician attention, especially if trying to assign a unifying diagnosis.

The correlation between somatoform disorder and depression was also significant and reflects that fact that depression often heralds itself with somatic rather than psychological symptoms. In addition to somatoform disorder, 12 of 15 symptoms

correlated positively with depression. The only two symptoms that did not correlate with a diagnosis of depression were ones that were concrete and that could be easily characterized as present or absent: fainting and GI symptoms (specifically patients were asked whether they had constipation or diarrhea). Data collected from the same clinic in 1999 reinforces the importance of somatic presentations. Despite predicted regional psychiatric prevalence rates in the 20% to 30% range, only 3.4% of reasons for presenting to clinic were documented as psychiatric in nature.[51] Community anecdotal evidence suggests that vague physical complaints often mask psychological symptoms during the medical encounter.

When assessing the independent effect of variables on depression through multivariate analysis, age, gender, somatoform disorder, and anxiety disorder were most predictive. When somatoform and anxiety disorders were excluded from the model, health perception remained a significant predictor of depression. Moreover, specific symptoms – joint pain, palpitations, nausea, and fatigue – were more highly predictive of depression than somatoform disorder alone. Of these, fatigue was the most robust predictor of depression, and interestingly can be classified as both a physical and psychological symptom.

The identification of predictors for depression can be used to develop screening tools. Given uniformly low detection rates, numerous groups have attempted to develop simple and efficient screening methods for depression. One group proposed screening by the 2-item PRIME-MD depression screen followed by evaluation of four depressive symptoms (sleep disturbance, anhedonia, low self-esteem, and decreased appetite).[64]

Another highlighted the presence of recent stress, five or more physical symptoms, and poor health as useful indicators of depression.[65]

For this group of patients, the presence of numerous ill-defined symptoms without immediately apparent medical cause should serve as a collective red flag for the primary care physician. In addition to an unusual number of symptoms, the health care worker should also be alerted to any specific symptoms that are subjective and chronic. In this study, joint pain, palpitations, nausea, and fatigue were most strongly correlated with depression; however, the non-specific nature of these symptoms makes them less reliable as screening tools.

Interestingly, anxiety is the strongest predictor of depression in the model but is not clinically useful as a diagnostic tool. Screening tools are meant to rule out certain disorders in a time-efficient manner. Although anxiety often co-presents with depression, diagnosing anxiety requires as detailed and lengthy an interview as diagnosing depression. Thus the practical applications of anxiety as a predictor of depression are limited.

Finally, the patient's perception of his or her health should be considered for use as a screening tool for depression. Although a negative health perception was not the strongest predictor of depression in the regression model, its relative effect increased when included in a model with variables that could be easily assessed in a primary care setting, e.g. a model that excluded anxiety. Health perception can be conceived of as a summary measure of the presence of somatic and psychological symptoms and can be screened for quickly and objectively in a primary care setting.

Prevalence estimates

Direct comparison of prevalence studies for depressive disorders is difficult because of a lack of homogeneity. Studies differ in terms of culture, patient population, sociodemographic factors, diagnostic instrument, and methodology. Furthermore, some studies focus on a subset of depressive disorder while others include all forms of mental illness.

Given these limitations, the prevalence figures determined in this study are consistent with those reported elsewhere. The overall depression rate of 32% is somewhat higher than the range reported for psychiatric diseases in international settings, between 17 and 24%.[10] The major depression rate of 13% is comparable to the rate of 10% frequently endorsed by the WHO.[7] Over 40% of patients diagnosed with depression in this study also had an anxiety disorder. This finding reflects a common trend of coexisting depression and anxiety presenting in primary care settings.

Limitations

Factors that might have influenced the reliability of diagnosing mental disorders include the instrument, interviewers, and physicians. Although PRIME-MD has been validated in many international settings, it has not specifically been tested for sub-Saharan Africa. The language and concepts implicit in the questionnaire were discussed with local physicians to assure the highest degree of patient understanding, but cultural barriers might have remained. Testing for validity in South Africa would entail a two-stage study using a standardized instrument or set of guidelines for comparison. Our findings might also have been biased by false positive or false negative results since neither the sensitivity nor specificity of PRIME-MD is 100%.

The utilization of two interviewers could also have introduced variability in administration of the instrument or interpretation of responses. The fact that depression rates were nearly identical for the two interviewers screening with PRIME-MD suggests consistency, but this conclusion relies on the assumption that the groups of patients interviewed by the two researchers actually had similar rates of depression. Finally, the diagnosis of somatoform disorder was contingent on a physician's ruling out organic cause of symptoms, but there was significant variation in the rates of somatoform diagnoses among physicians. It is difficult to determine whether this reflects differences in the actual rates of somatoform disorder in patients presenting to different physicians or differences in physician threshold for diagnosing the disorder.

Several factors might have affected data on detection of depression. First, a prescription of a TCA was used as a marker for a diagnosis of depression, yet physicians prescribed antidepressants for reasons other than depression, and a TCA might not have been prescribed in every case of depression. The TCA was used as a marker because it was the primary means of treating depression and was the most reliable marker available. Chart notes did not consistently include rationales for treatment, and one physician charted in Afrikaans. Second, it is possible that administering PRIME-MD to patients primed them to mention symptoms to their doctor that would otherwise not have been elicited. It is difficult to predict the effect of a pre-interview, however since patients were asked about a wide range of issues including both somatic and psychological symptoms. Third, the determination of past receipt of a TCA might have been imperfect because chart review preempted anecdotal information from the patient. Chart review was employed as a default measure to reduce the possibility of recall bias, especially if the

patient had been on an antidepressant in the distant past. There remains, however, the possibility that a patient without chart documentation had in fact been on a TCA prescribed by another caregiver.

Implications

1) Somatization

The data gathered in the study strongly suggest that depression in this setting is presenting as a cluster of nonspecific physical symptoms. This result is consistent with the fact that mental illness can present differently in different cultures and countries, and that somatization is especially common in African settings. The presentation of mental illness as somatic symptoms is traditionally perceived to be an impediment to detection, propelling physicians to consume energy and resources chasing physical etiologies of the symptoms. In this clinic, however, it was shown that physicians prescribing TCAs are primarily responding to somatic rather than psychological symptoms.

The unexpected and welcomed finding, then, is that physicians who appeared to be responding to a trigger other than depression in their prescription patterns were actually responding to depression in an alternate form. While previous studies suggest that somatized depression might be a barrier to diagnosis, we have found that in this South African clinic, somatization may in fact be what is recognized and treated by physicians who are culturally sensitive to their environment. By prescribing antidepressants to poly-somatizing patients, South African physicians are paradoxically interpreting somatic symptoms as a guide rather than an impediment to recognizing depressed patients.

2) Social, cultural and political considerations

As suggested in the discussion of somatization, cultural variations can affect disease presentation, medication compliance, and interpretation of research, to name just a few areas. An analysis of mental health care in South Africa underscores the importance of taking into account social, cultural, and political forces when considering disease. Social factors such as poverty and unemployment dramatically influence mental health disorder prevalence and ability to access medical care. Language specific to a culture affects understanding of disease – consider whether a problem with "nerves" implies an anxiety or a mood disturbance, or none at all. Widely accepted stigma can bar individuals from care or treatment and can demoralize communities. And political commitment is reflected in the breadth of health coverage and formularies and in the financing of the public health sector.

While much research has been devoted to explaining the barriers to diagnosing depression in the primary care sector, few studies have compared these barriers across different cultural settings. One formidable barrier to care is lack of adequate access to appropriate medication, a problem often linked to culturally specific determinants. At the time of this study, South Africa's national health insurance did not cover SSRIs. Tricyclics were often prescribed at sub-therapeutic doses to avert side effects that often caused noncompliance. The fact that the most well tolerated antidepressants were not available to South Africans reflects limitations in the South African health care system and a lack of political commitment at the national level to prepare an inclusive formulary. Within the past several years, fluoxetine (an SSRI) has become available to all community health centers in the Cape Town region at the cost of 75 mg of a TCA.

Positive changes such as this one underscore the importance of political commitment in mental health care.

3) Implications for South Africa and global mental health

The results of this study can help to address issues in mental health care specific to South Africa. The impressive somatization of depression observed has implications for screening. While physicians in this clinic were cognizant of the somatic presentation of depression as indicated by their prescribing patterns, South African health care practitioners not already aware of this trend must be trained to recognize that somatic symptoms can in fact represent depression. Structuring the system around this conclusion might call for significant reorganization, such as adding front-line staff or training community mental health nurses to pre-screen for the presence of somatic symptoms prior to the physician visit.

A second consideration specific to South Africa is the interaction between mental illness and HIV/AIDS. Being HIV positive has been linked to depression, and South Africa is estimated to have the highest number of HIV positive individuals of any country. This fact alone implies that the prevalence of depression and other mental illness is likely significantly higher than observed. Like depression, HIV is stigmatized, and the effects of discrimination might exacerbate psychological distress. Moreover, being depressed in the presence of HIV can affect quality of life and disease progression. Maintaining health in the face of HIV depends on a dutiful adherence to a complicated medical regimen. While most HIV positive individuals in South Africa do not yet have access to HAART (highly active antiretroviral therapy), depression would likely hinder a

patient's ability to handle the medications when they do become available. Presently, depression is likely to affect adherence to prophylactic medications.

This study confirms prior findings that mental illness is common across national boundaries and that interventions should be tailored to specific settings. While the experiences of South Africa might apply to other developing countries or to underserved regions of any country, it is important to consider the specific setting and local influences when examining burden of disease or developing policy. This study was conducted in a single clinic with a relatively homogenous catchment population. The group studied represented a single race – Coloured – that accounts for only 8% of South Africa's population. The social problems experienced by this group might reflect those in other countries and cultures, but it cannot be assumed that the conclusions drawn are necessarily applicable to other settings. Rather, other countries must develop analogous research protocols and policy that reflect specific social structures, patient attitudes, provider backgrounds, and health care systems.

Conclusion

Mental illness in developing countries is common, and statistics likely vastly underestimate the true burden of disease. Physicians are limited in their ability to diagnose mental illness – particularly in its somatized form – and detection rates are consistently low. The consequences of mental illness far outreach the direct effect on an individual: mental disorders are costly in terms of global human distress and in terms of national productivity and health. Ironically, this group of disorders is more costly to struggling nations that simultaneously confront formidable social problems and limited resources. Mental health problems can redirect the course of an individual's life and are

predicted to escalate globally. For these reasons, policy around mental illness should be thoughtfully and rapidly formulated, even in the setting of conflicting priorities. Without this degree of commitment, we will invite a decline in global well-being in the years ahead.

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APPENDIX A: MAPS

South Africa

The Cape Peninsula

APPENDIX B: PATIENT INFORMATION SHEET

You are invited to participate in a study of the diagnosis and treatment of depression in primary care health clinics. The purpose of the study is to determine how many patients who come to clinics like Lotus River are depressed, and to determine how they are treated for depression. We would also like to talk to you about how you feel about the medical care you have received at this clinic, and about your treatment for depression if you have received any. You have been selected at random because you came to Lotus River Community Health Centre today.

Participation in the study will involve a fifteen-minute interview that includes questions about your recent health and activity level, and about how happy you have been. We will also ask whether you have been diagnosed or treated for depression in the past. Some patients who have been diagnosed with depression or have been treated with antidepressants might have a longer interview (over an hour) about any stresses in their lives and about their feelings concerning the treatment they have received. These interviews will be taped on a recorder so that we can make sure the information we obtain is accurate. We may ask you do the second longer interview at a later time.

The information we collect from this study will help us understand how depression is treated at this clinic. By determining how many patients are depressed, how many are treated, and whether the treatment is working, we can figure out whether there is some way to improve treatment and better care for depression in health care settings where there may not be a psychiatrist available.

With your permission, we would like to look at your medical record. All information that you share with us will remain completely confidential. Your name will be recorded so that we can access information in your medical chart but after that point your name or any other identifying information will not be used. There are no physical risks to this study. However, the time that it takes to conduct the interview may be inconvenient. This study will not affect your medical treatment in any way. You do not need to reply to any question that you feel uncomfortable answering.

Please feel free to ask us any questions that you might have about this research and your role as a participant.

Thank you very much for reading this sheet and for considering participating.

APPENDIX C: STATISTICAL OUTPUT

STATA output displaying the logistic regression of visit TCA on depression, gender, and somatoform disorder.

```
Logit estimates                                 Number of obs   =         196
                                                LR chi2(3)      =       13.43
                                                Prob > chi2     =      0.0038
Log likelihood = -64.157196                     Pseudo R2       =      0.0948

------------------------------------------------------------------------------
 visit_tc |     Coef.   Std. Err.       z     P>|z|     [95% Conf. Interval]
----------+-------------------------------------------------------------------
 depressi |   .3667654   .4930676     0.744   0.457    -.5996292     1.33316
   gender |   .9026865   .5879178     1.535   0.125    -.2496113    2.054984
 somatofo |    1.27969   .4901979     2.611   0.009       .31892     2.24046
    _cons |  -3.338076   .5841399    -5.715   0.000    -4.482969   -2.193183
------------------------------------------------------------------------------
```

Figure 4: STATA output displaying the logistic regression of depression on age group, gender, somatoform disorder, and anxiety disorder

```
Logit estimates                                 Number of obs   =         197
                                                LR chi2(4)      =       55.01
                                                Prob > chi2     =      0.0000
Log likelihood = -94.404129                     Pseudo R2       =      0.2256

------------------------------------------------------------------------------
 depressi |     Coef.   Std. Err.       z     P>|z|     [95% Conf. Interval]
----------+-------------------------------------------------------------------
 age_grou |  -.4413942   .1698373    -2.599   0.009    -.7742692   -.1085192
   gender |   1.207742   .4242458     2.847   0.004      .376235    2.039248
 somatofo |   1.221318   .3818549     3.198   0.001     .4728966     1.96974
  anxiety |   1.584835   .4267969     3.713   0.000     .7483287    2.421342
    _cons |  -1.067351   .6545869    -1.631   0.103    -2.350317     .215616
------------------------------------------------------------------------------
```

Figure 5: STATA output displaying the logistic regression of depression on age group, gender, somatoform disorder, joint pain, palpitations, nausea, and fatigue

```
Logit estimates                                 Number of obs   =         204
                                                LR chi2(7)      =       95.72
                                                Prob > chi2     =      0.0000
Log likelihood = -80.556549                     Pseudo R2       =      0.3727

------------------------------------------------------------------------------
 depressi |     Coef.   Std. Err.       z     P>|z|     [95% Conf. Interval]
----------+-------------------------------------------------------------------
 age_grou |  -.7874901   .1978674    -3.980   0.000    -1.175303   -.3996771
   gender |   .8822751    .442929     1.992   0.046     .0141502      1.7504
 somatofo |   .8350391   .4215117     1.981   0.048     .0088913    1.661187
    joint |   1.259086   .4388992     2.869   0.004     .3988596    2.119313
     palp |    1.18413   .4336542     2.731   0.006     .3341837    2.034077
   nausea |    1.55165   .5012029     3.096   0.002     .5693099    2.533989
  fatigue |   1.868995   .4715866     3.963   0.000     .9447018    2.793287
    _cons |  -1.890459   .7249946    -2.608   0.009    -3.311423    -.469496
------------------------------------------------------------------------------
```