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## RESEARCH ARTICLE

### Psychosocial Basis of Human Sufferings and Poverty in Patients with Neurological and Psychiatric Disorders

Souvik Dubey<sup>1</sup>, MD, DM; Ritwik Ghosh<sup>2</sup>, MD; Mahua Jana Dubey<sup>3</sup>, MD; Shambaditya Das<sup>1</sup>, MD, DM; Arka Prava Chakraborty<sup>1</sup>, MD, DM; Arindam Santra<sup>1</sup>, MD, DM; Ajitava Dutta<sup>1</sup>, MD, DM; Dipayan Roy<sup>4,5</sup>, MD, DNB, PhD; Alak Pandit<sup>1</sup>, MD, DM; Biman Kanti Roy<sup>1</sup>, MD, DM; Gautam Das<sup>1</sup>, MD, DM; Julián Benito-León<sup>\*,6,7,8,9</sup>, MD, PhD

Department of Neuromedicine,<sup>1</sup> Bangur Institute of Neurosciences (BIN), Kolkata, West Bengal, India; Department of General Medicine,<sup>2</sup> Burdwan Medical College, and Hospital, Burdwan, West Bengal, India; Department of Psychiatry,<sup>3</sup> Berhampur Mental Hospital, Berhampur, West Bengal, India; Indian Institute of Technology (IIT) Madras,<sup>4</sup> Chennai, Tamil Nadu, India; School of Humanities,<sup>5</sup> Indira Gandhi National Open University (IGNOU), New Delhi, India; Department of Neurology,<sup>6</sup> University Hospital "12 de Octubre", Madrid, Spain; Research Institute (i+12),<sup>7</sup> University Hospital "12 de Octubre", Madrid, Spain; Centro de Investigación Biomédica en Red Sobre Enfermedades Neurodegenerativas (CIBERNED),<sup>8</sup> Madrid, Spain; Department of Medicine,<sup>9</sup> Complutense University, Madrid, Spain

\*Corresponding author: ([ibenitol67@gmail.com](mailto:ibenitol67@gmail.com))

#### Author contributions

All authors contributed significantly to the creation of this manuscript; each fulfilled the criteria established by the ICMJE.

#### ABSTRACT:

Neurological disorders and psychiatric ailments often lead to cognitive disabilities and low attainment of education, pivoting misconceptions, myths, and misbeliefs. Poverty and low educational attainment are intriguingly associated with poor awareness and perception of these diseases that add to the suffering. Poverty goes parallel with a low level of education and is intricately associated with neuropsychiatric ailments, which have the potential to spread transgenerationally. Robust education policies, proper government rules and regulations against the spread of disease-related myths and misconceptions, uplifting medical education in its true sense, voices against consanguinity, and programs to raise scientific perception about diseases can help to throw light at the end of this dark tunnel. In this article, the authors intend to 1) decipher the potential psychosocial basis of human suffering and poverty in patients with neurological and psychiatric disorders, and 2) discuss the apropos way-outs that would potentially mitigate suffering, and alleviate the economic burden and cognitive disabilities of families with neuropsychiatric diseases.

**Keywords:** Poverty; Human Suffering; Neurological disorders; Psychiatric disorders.

## Introduction

Neurological disorders and psychiatric ailments have strong genetic predispositions. [1,2] This, in turn, leads to an ever-increasing cumulative burden of neurological and psychiatric diseases in families and the community at large due to a dire lack of genetic counseling. [1,2] In developing countries where genetic counseling is outside the reach of the majority, it has been an everlasting issue.

This statement seems to be a meagre oversimplification of the actual state of affairs the authors intend to disclose in this article. Stroke, epilepsy, and neuroimmunological demyelinating, neurometabolic, and degenerative diseases have specific neuroanatomical involvement and a pathological and molecular basis. [3-7] Interestingly, similar areas of neuroanatomical involvement and shared pathological and molecular basis have been observed in various psychiatric ailments/symptoms, which strongly argue against neural cubism and explain the basis of several clinical entities with overlapping neurological and psychiatric symptoms. [7-13] The fascinating area to discuss is allelic heterogeneity, which explains that different mutations of the same genetic locus can lead to manifestation of different disease phenotypes/phenocopies. [7-13] The underlying mechanism is either quantitative or qualitative gene mutation with a consequent impact on its downstream signals. [7-13] Extrapolation of allelic heterogeneity and pleiotropy in the neuropsychiatric continuum provide the best explanation for a family with a history of genetic neurological diseases may have psychiatric ailments or vice versa, considering overlapping clinical features and shared anatomical, pathological, and molecular basis of various neuropsychiatric ailments. This leads to an increased cumulative burden of neuropsychiatric diseases in families and society with significant deleterious social and economic consequences by the following possible mechanisms underpinning. [7-13] In this article, the authors intend to 1) decipher the potential psychosocial basis of human suffering and poverty in patients with neurological and psychiatric disorders (figure), and 2) discuss the possible way-outs that would potentially mitigate suffering, and alleviate the economic burden and cognitive disabilities of families with neuropsychiatric diseases.

### **Genetic and epigenetic basis of cognitive disabilities:**

The basic difference between central nervous system (CNS) disorders and the diseases of other systems is that cognitive functions and behavior of individuals are frequently jeopardized in the former and remain relatively stable in the

later. The learning and education of society depend on individuals' cognitive abilities, which are frequently disrupted in neurological ailments. Moreover, building blocks of behavioral development of individuals also get disrupted since early childhood in patients with neurological diseases. This is because healthier parenting is often not possible in a family with neuropsychiatric ailments as parents usually suffer from widely variable phenotypes/phenocopies of genetically governed neuropsychiatric issues. [14-18] Examples are ample. In children with genetic epilepsies, though a family history of epilepsy is not found most of the time (especially in developing and underdeveloped countries), studies and our life experience have demonstrated significant psychopathology/personality disorders among parents with epilepsy. [19-22] Moreover, parental psychopathology and related burden in children with autism spectrum disorder and attention-deficit/hyperactivity disorder are frequently described in contemporary literature. [23-27] Intricate relationship between the presence of tics, Tourette's syndrome, and attention-deficit/hyperactivity disorder with a positive family history of obsessive-compulsive disorder (OCD), again speaks in favor of allelic heterogeneity/cross-disorder and puts forth the idea of the shared anatomical and pathobiological basis of some neurological and psychiatric disorders. [28,29]

A myriad of neurological manifestations characterize most neurometabolic diseases and inborn errors of metabolism. However, the burden of cognitive disabilities since early childhood is the most noticeable, striking, and constant feature. Childhood neurodevelopment disorders usually have a strong genetic predisposition. The parents of these children also have an increased chance of suffering from neurological diseases (similar or different neuropsychiatric disorders due to allelic heterogeneity/pleiotropy), harboring some neurological or psychiatric ailments that may have a significant impact on cognition and behavior. [30-33] These further fuel the neurological and psychopathological issues in the families. This coupled with disrupted thought processes might have complex relationships with faulty parenting and inappropriate health-care-seeking behaviors. [30-33]

### **Social contributions to the genesis of difficult understanding and misconceptions:**

Behavioral issues have been intricately intertwined in neurology, and their expression in families is varied and common. This is why a family with neurological diseases may also harbor truncated psychological issues. However, most of the

time it remains uncared for, unattended, and undetected. This further increases the silent burden of psychological issues in these families and community at large, resulting in a change in disease perception, a faulty basic understanding of diseases, taboos, myths, and metacognitive biases which make the "road to health" full of obstacles. [34,35] This has been further coupled with inadequate/inappropriate healthcare infrastructures, "medical touts", "quacks" (indigenous medical practitioners), corruption, and "infodemic". All of them in combination make the "brain" fertile for the development of taboos, misconceptions, misbeliefs, metacognitive biases, and myths, which in turn, deters the development of appropriate health-seeking behavior. [36-38]

Most of the time, degenerative and irreversible diseases further complicate the issue. The genetically, structurally, or functionally compromised brain is predisposed to acquired brain diseases. [39,40] Several acquired neurological diseases have been observed in greater frequency among patients with genetically or structurally compromised brains and a history of hypoxic-ischemic encephalopathy (HIE). [39-41] HIE has been commonly considered as one of the dominant markers of inappropriate health awareness, poor health care delivery system, and poverty. [40-42] But in a real sense, poor health awareness/health-seeking behavior, faulty healthcare delivery, and poverty stem from a failure of the education system and a lack of higher cognitive exercising abilities in daily life. [43,44] Cognitive distortions and metacognitive biases in our society also have a crucial role to play in this regard. [45] Assumptions of the occurrence of acquired neurological ailments in patients with preexisting/background behavioral issues and disruptive cognitive functions are not far-fetched. This evidenced by the diseases with initial psychological/behavioral issues later mingled with neurological ailments, reflecting and at the same time enforcing the basic need for understanding of the complete spectrum of the disease under neuropsychiatric conundrum. [46-49] Families with genetically triggered psychological issues have every chance of heralding neurological ailments and vice versa. An overlapping spectrum of neurological and psychiatric issues harboring several genetic correlations underneath, only visible by its finer sense, reflects the two sides of a similar disease conundrum. [45-49]

### ***Pitfalls in perception***

Contemporary studies revealed that neuroticism in early life could have an intriguing relationship with the development of Alzheimer's

and Parkinson's diseases later. [50-52] Neuroticism, also believed to affect Alzheimer's disease neuropathology, may be indicative of differential and the diverse manifestation of the same disease continuum sequestered temporally. [50-53] Behavioral manifestations of neurological ailments may be disseminated over time and, at the same time, may impact primary disease as well. [53] Overlap behavioral symptoms with so-called "organic" neurological ailments have long been underestimated. Behavioral issues among the close family members of patients with neurological disease influence the disease perception, understanding of the disease, and related healthcare-seeking attitude. [54,55] In our experience, the faulty perception of the disease manifestation in the developing/underdeveloped regions of the world lead to the need for multiple health-seeking attitude; this often leads to biased and misleading counterintuitive and counterproductive opinions, which pave the path for a huge economic burden on the community and reinforce unethical "medical business". [54]

Low educational attainment has been thought to act as the foundation-stone for poverty. This, again, is thought to stem from disruptive cognitive abilities, which, unfortunately, herald generations with low cognitive abilities, cognitive biases, metacognitive distortions in mind, and economic burden on the shoulder. [54-57] All of these form a vicious cycle and predispose to an ever-increasing poverty and economic crisis, subsequently leading to disabled families and society, constituting the basis of human suffering. [54-58]

The natural history of diseases coupled with misguidance from the medical fraternity, augment of misbeliefs, misconceptions, and myths, and further fortify each other firmly borrowing an example, a demyelinating CNS disease can have a spontaneous recovery; however, if incidentally that spontaneous recovery coincides with a treatment with alternative medicine or some treatment based on "pseudoscience", it will give rise to a faulty perception. This misperception gets stored permanently inside the brain of family members/caregivers who, by default, are also genetically predisposed to have some neuropsychiatric ailments, either full-blown or in its truncated forms, leading to the formation of a hub of misconceptions and metacognitive biases within the families, which usually get "viral" viciously through the porous avenues of social media. [59]

Overindulgence, common in families with neuropsychiatric diseases, is considered one of the components of behavioral addiction, which usually gives rise to myths, metacognitive biases, and

superstitions. [59-67] Patients with neuropsychiatric ailments with low cognitive abilities, behavioral issues, physical limitations, and low conscientiousness levels are likely to be taken advantage of and misdirected by persons with low conscientiousness levels but with relatively better cognitive abilities. This contributes majorly to align the threads of addiction network (behavioral addiction and substance use disorders) and organized crime together. [59-68] Furthermore, hyperreligiosity and over-ritualistic behaviors (as a part of the symptom complex of OCD) extend their hands to bolster up "pseudo beliefs", misconceptions, and superstitions. [69-76] Every minor detail and important scientific observation is always exigent to be registered and must be adequately substantiated through statistics. However, it may not be always possible to substantiate statistically, but that does not make these observations wrong or unworthy. [77-79] Contrary to the contemporary research approach, it is going to be onerous to perceive, interpret and determine the degree and severity of disruption of the default mode network (the "social brain"), misconceptions, and metacognitive distortions which ruin the society/community at large. [76] Due to lack of objective methods for measuring these parameters, these observations remain untold. However, one can also not deny its existence. Rather, here the authors intend to say with affirmation that statistical jugglery often misses the finer interpretations and observations, which is responsible for misinterpretation and faulty appreciation of the current scenario and may cause harm to the healthcare system in developing countries. [77-79] Aimless endeavor to quantify and analyze qualitative data further complicates the state of affairs. Issues of developing low- and middle-income countries are different from those of developed countries. [77-86] The maladaptive appraisal, high regard towards an "undeserving" indigenous practitioners/medical professional or medical institution(s) shown by the general people with low educational attainment and low cognitive reserve, "pseudo beliefs" or with OCD, often result in "pseudo inflation" of reputation/ego among the persons concerned. [87-95] These form the basis of several loopholes in identifying appropriate medical professionals/institutions to be consulted, resulting in the development of a "GOD-complex" among some professionals, casting a huge economic burden on the individuals or society at large and have the potential to mislead the entire ailing community. [87-95] Poor educational background secondary to low cognitive reserve, behavioral issues due to co-clustering of neurological ailments, and poor perception and basic understanding of disease lead to "stigmatization" of several diseases,

negatively impacting the healthcare-seeking behavior of the community. [87-95]

"History taking", the "forgotten skill" with the unique potential to diagnose several neurological ailments, has been submerged into oblivion. Medical professionals are thus compelled to be inclined towards the (in the light of inappropriate appraisal of history) current costlier sophisticated investigations without adequate yield, putting a huge economic burden on the frail community. [77-79] The entire scenario stems from improper/vague disclosure of history by the family members of patients with neurological ailments, in most cases, arising from the poor perception of disease symptomatology and low educational attainment. Although, in the minority of cases, proper history elicitation on the part of medical professionals appears to be faulty, both increase the suffering of the ailing community exponentially. For example, caregivers blatantly denying any family history of neuropsychiatric illness occurs quite commonly in our daily practice. In our lifetime perception, this is often absolutely erroneous, as most neurological and psychiatric diseases are not sporadic in the true sense. However, the contradictory notion prevails probably due to either erroneous historical interpretation, poor perception about the 'disease continuum' (among both caregivers and sometimes consultants' level), or failure to appreciate different faces of the same disease; for example, the effect of "multifactorial inheritance" and the role of multiple genes playing simultaneously for a specific disease like schizophrenia, depression, or Alzheimer's disease. Family history of neuropsychiatric disorders is hardly believed to be negative as several association studies have already established the crucial relationship of parental psychopathology in patients with epilepsy, autistic spectrum disorder, attention deficit hyperkinetic disorder, and tics. [96-106]

### **Parental psychopathology**

The association of parental psychopathology in neurometabolic (e.g., Wilson's disease) and neuroimmunological diseases (including demyelinating diseases of CNS) are yet to be established. [107-114] However, our lifetime observations have revealed various psychopathologies among parents/caregivers that are not merely explained by depression and anxiety related to the sufferings of their children/closer ones from severe neurological ailments. This might probably be arising from the truncated or partial effect(s) of the same genetic mutation(s) their children are harboring, resulting in the expression of underestimated behavioral

counterpart of the same disease conundrum. [107-114] The same applies to various neurodegenerative diseases.

The authors have experienced that even in neurodegenerative dementias like Alzheimer's disease, frontotemporal dementia, and dementia associated with Parkinson's disease, there is a plethora of psychiatric manifestations (evident from retrospective history analysis) among patients having the diseases, i.e., neurodegenerative dementias, as well as among their first-degree relatives. This only firmly postulates that neurodegenerative diseases have their pathogenetic clue, potentially hidden much upstream, and can have either isolated neurological or psychiatric manifestations or expression of disease through the plane of neuropsychiatric convergence. [107-114] The strong association between neuroticism and the development of Alzheimer's disease in later life also holds the notion of neuropsychiatric convergence firmly. It can be extrapolated to any disease entity started in either way and finally merged into a neuropsychiatric continuum. [50-52] This further explains that the same genetic abnormality or multifactorial inheritance can have a specific disease with diverse and varied phenotypes. Herein, the authors intend to draw the diagram of the complete neuropsychiatric loop rather than focus upon only neural or psychic components separately, which can result in a skewed interpretation and under-recognition of the entire aspect of any neurological or psychiatric disease entity.

Psychopathologies of first-degree family members of degenerative or genetic neurological or psychiatric disease(s), which authors hypothesize to stem from a truncated or erratic representation of similar genetic perturbation(s) coupled with environmental influences (i.e., multifactorial inheritance and epigenetics), potentially pave the path for poor cognitive abilities, lower educational attainments, higher-order perceptual difficulties, defective sensory processing, disorders in appreciation of environmental influences, the surge of myths, misconceptions, magical beliefs, mass-hysteria, metacognitive biases as well as distortions, and stigmatizations. These issues get further complicated by poverty and unemployment and evolve around consanguinity, the harbinger of cumulative neuropsychiatric disease burden within the family. [107-114]

### ***Loopholes in medical education***

The shared pathophysiological basis of neurological and psychiatric ailments often manifests with truncated neuropsychiatric manifestations (i.e., only behavioral symptoms),

leading to the cumulative burden of neuropsychiatric illness in the family. These are coupled and interrelated with low cognitive abilities, poverty, unemployment, consanguinity, magical beliefs, misconceptions, myths, mass hysteria, herd behaviors, metacognitive bias, and distortions, social deprivation, lack of proper guidance and infrastructure, stigmatizations, the devastating natural course of degenerative diseases in association with wrong perception and understanding of disease(s) evolve around the sufferings of the human being with neurological ailments. [115-120] Common neurological diseases like stroke, epilepsy, demyelinating disorders, immunologically mediated diseases, neurometabolic diseases, and degenerative diseases have strong genetic bases. [107-120] Family history of similar illness may be absent. However, if asked specifically, other neurological or psychiatric ailments in close family members often indicate an underlying crucial and intricate genetic basis with diverse disease phenotype(s). [107-121] Most noteworthy in this notion is that even neuroinfectious diseases have a strong family history of neurological and psychiatric ailments if carefully looked into, indicating that brain has to be genetically compromised even for neuroinfection.

The cumulative neuropsychiatric and consequent economic burden on family and society largely become manifold by the manipulative claws of "corruption" and "infodemic" known to thrive on spreading misconceptions and mistrust against the medical fraternity. [122-125] "Human sufferings" toughens its roots by breach of beliefs in the doctor-patient relationship, primed by mistrust, misconception, poor perception about diseases, and faulty stress-coping strategies among caregivers. Poor perception about diseases, lack of understanding, disruptive cognitive abilities, idiosyncratic beliefs, distortions in history deliberation, and inability to express exact problems stemming from low educational levels all eventually lead to excessive dependence on the irrational cascade of investigations and interventions, leaving the enormous economic burden on the already-frail community with neuropsychiatric diseases continuum, in association with disrupted cognitive abilities and reserve. [122-134]

Patterns of basic medical education (graduate) and higher medical education (post-graduate and post-doctorate) in developing countries have flaws that directly and indirectly enhance suffering. In most institutions of developing countries, there is little room for combined neurology and psychiatry training for residents resulting in a truncated/skewed knowledge base



about diseases of the same conundrum/spectrum leading to frequent misdiagnosis, over-dependence on investigations, and polypharmacy as well as therapeutic misadventures. [134-146]

Questions may arise about whether an accurate diagnosis of advanced neurodegenerative or irreversible diseases is essential, as the prognosis remains the same even after an accurate diagnosis. However, accurate diagnosis is essential and of utmost importance 1) to curtail caregivers' stress; 2) to limit the need for multiple consultancies; 3) to establish appropriate coping strategies; 4) to get rid of huge economic burden due to multiple consultancies; 5) to decrease the need for admission and irrelevant investigations, and last but not least; and 6) to raise voice against myths, misconception, mistrust, misbeliefs, and social stigma. Furthermore, the irreversible nature of diseases frequently has an underpinning genetic basis, which, if identified in the same due course of the diseases, also helps in genetic and premarital counseling to decrease the transgenerational spread of irreversible genetic diseases, which will eventually decrease neuropsychiatric disease burden and cognitive disabilities in families as well as in society. [147-154]

In most developing countries, psychiatric ailments and various neurological illnesses like epilepsy have enormous social stigma, and people with these diseases are ostracized at a large scale by society due to poor perception, awareness, and low education. [155-161] Family members of patients with psychiatric illnesses, as well as patients with epilepsy, often try to hide their history due to fear of being social outcast and many times due to their cognitive disabilities (probable causes of which have been discussed earlier) and poor perception and knowledge about the diseases, results in further complications and misdiagnosis. [157-163] Faulty healthcare-seeking behavior and attitude often leads to the inappropriate selection of "specialists" and makes room for quacks, alternative medicine, and "pseudoscience" to flourish, which further strengthens the taboos, stigma, and suffering. [155-163]

Authors' experience in neurology outpatient departments (OPDs) unveiled that patients having pure somatoform pain disorders, somatization, depression, obsessive-compulsive spectrum disorders, and dissociative conversion disorder share the major percentage of daily OPD visitors (poor execution of referral system) and are also being satisfied by knowing that they have "nerve problems". These patients become disappointed on disclosing that they have psychiatric issues and need to get treatment from psychiatrists and are not ready to accept even if

counseled correctly. [155-161] On the other hand, authors have also found a good number of patients with epilepsy, "organic" psychosis, and "organic" mood disorders in psychiatry OPDs of other tertiary-care hospitals (ongoing study by same authors; data unpublished).

As mentioned, due to lack of integrated training in neuropsychiatry frequently patients with psychiatric ailments are being partially, incompletely and inefficiently treated by neurologists. The behavioral presentations of "organic" systemic and neurological diseases like systemic lupus erythematosus psychosis, autoimmune encephalitis, Wernicke's aphasia, Wernicke's encephalopathy, Wilson disease, behavior variant of frontotemporal dementia, Alzheimer's dementia, Huntington's disease, non-motor presentation of Parkinson's disease, diffuse Lewy-body disease, episodic presentations of Moyamoya angiopathy, transient ischemic attack, multiple sclerosis, complex partial seizures (non-motor, behavior and cognitive arrest variants), sub-acute sclerosing panencephalitis, and progressive myoclonic epilepsies are frequently being misdiagnosed by psychiatrists, results in series of investigations, multiple consultations, frequent hospital admission, need for polypharmacy, economic burden and enormous sufferings of patients and family members. [135-154]

#### **Future directions**

Endeavor to cut short the sufferings, poverty and economic burden of families with neuropsychiatric ailments must include: 1) raising scientific voice against consanguinity to break the chain of exponential expression of pathogenic gene in the families; 2) wherever appropriate, even in resource-poor developing countries, provision for genetic testing and genetic counseling should be offered; 3) robust infrastructure of free education for all children should be the primary notion and must be executed with vigilant higher-authority supervision (because education is the backbone behind the development of any nation, and children are the building blocks of any nation in making); 4) strict vigilance and legislations to be ensured against misdirected, myths and misconception-based health news in electronic, printing and social medias; 5) promotion of positive education-based mass-campaign programs, with the help of the "mass leaders" against taboos, misbeliefs and stigma about neuropsychiatric ailments to be organized at regular intervals under supervision of concerned committees; 6) people must be encouraged to share their mental issues freely with family members and with psychiatrists through health education, and at the same time, they should

be warned about possible disastrous outcome of suppression; 7) indigenous medical practitioners are needed to be educated and trained enough before declaring them capable of dealing with neuropsychiatric ailments (if at all this is necessary in rural poverty-stricken pockets of low- and middle-income countries); 8) unethical polypharmacy, irrational investigations as well as any vested interest other than patients' benefit must be condemned and prohibited authoritatively; and lastly 9) integrated and comprehensive training program for neurology and psychiatry residents must be instituted at the earliest in all developing low- and middle-income countries to overcome the skew-deviation in patients' diagnosis, and treatment, with an aim that it would potentially mitigate sufferings, alleviate economic burden and cognitive disabilities of families with neuropsychiatric diseases.

#### **Declaration of Conflict of Interests**

We wish to confirm that there are no known conflicts of interest associated with this publication, and there has been no significant financial support for this work that could have influenced its outcome.

#### **Data Availability Statement**

No datasets were analyzed or generated during the current study as it is a theory-based article.

#### **Ethical Statement**

The Ethical Committee did not approve the study as it is a theory-based article.

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#### **Disclosures:**

Souvik Dubey ([drsouvik79@gmail.com](mailto:drsouvik79@gmail.com)) reports no relevant disclosures.

Ritwik Ghosh ([ritwikmed2014@gmail.com](mailto:ritwikmed2014@gmail.com)) reports no relevant disclosures.

Mahua Jana Dubey ([drmjpsy03@gmail.com](mailto:drmjpsy03@gmail.com)) reports no relevant disclosures.

Shambaditya Das ([drshambadityadas@gmail.com](mailto:drshambadityadas@gmail.com)) reports no relevant disclosures.

Arka Prava Chakraborty ([thearka.chak@gmail.com](mailto:thearka.chak@gmail.com)) reports no relevant disclosures.

Arindam Santra ([drarindam1990@gmail.com](mailto:drarindam1990@gmail.com)) reports no relevant disclosures.

Ajitava Dutta ([ajitava.dutta.1990@gmail.com](mailto:ajitava.dutta.1990@gmail.com)) reports no relevant disclosures.

Dipayan Roy ([dipayan.1993@yahoo.in](mailto:dipayan.1993@yahoo.in)) reports no relevant disclosures.

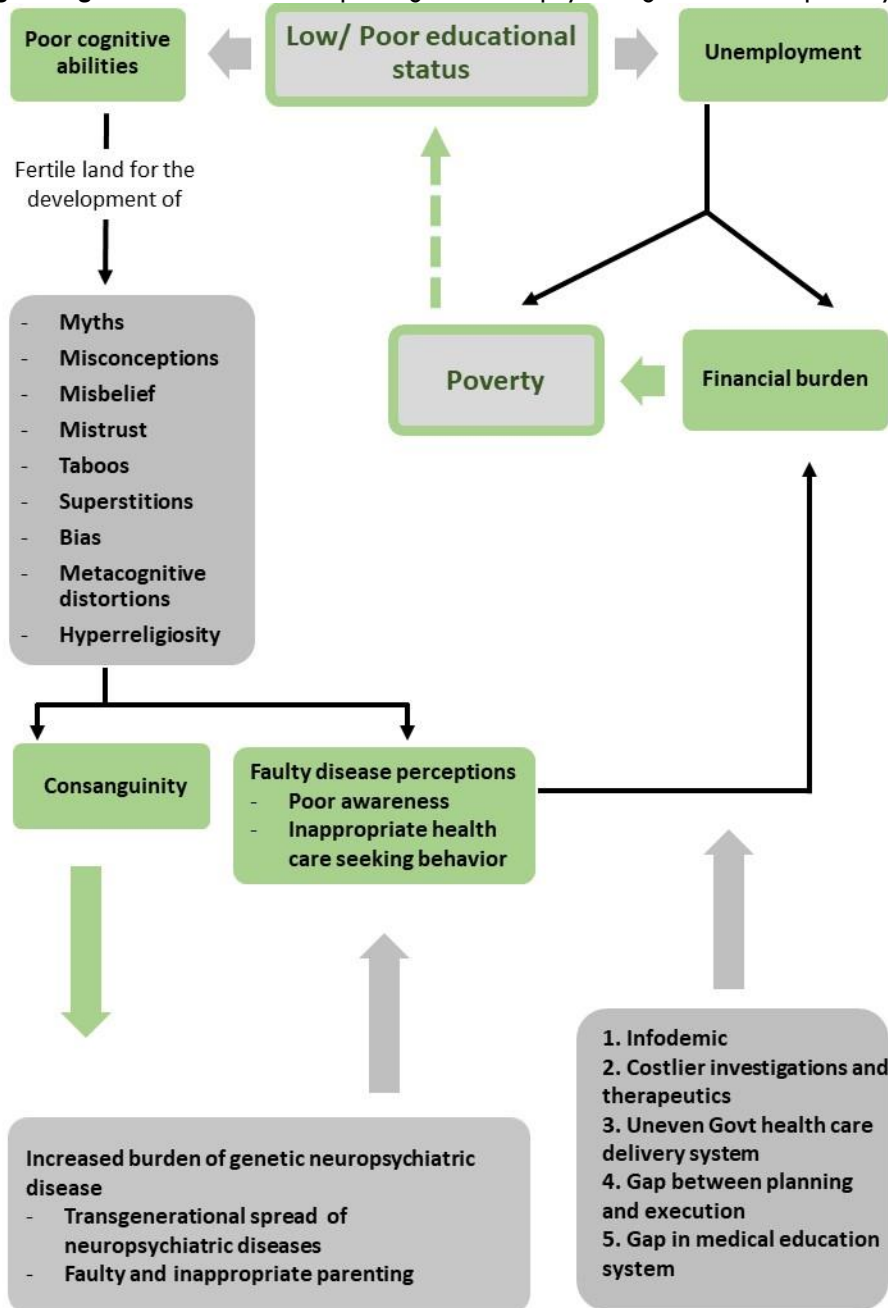
Alak Pandit ([dralakpandit@gmail.com](mailto:dralakpandit@gmail.com)) reports no relevant disclosures.

Biman Kanti Roy ([bimankantiroy2019@gmail.com](mailto:bimankantiroy2019@gmail.com)) reports no relevant disclosures.

Gautam Das ([drgautamdasmd@gmail.com](mailto:drgautamdasmd@gmail.com)) reports no relevant disclosures.

Julián Benito-León ([jbenitol67@gmail.com](mailto:jbenitol67@gmail.com)) reports no relevant disclosures.

**Figure legend:** Flowchart underpinning the neuropsychological basis of poverty and human suffering.





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